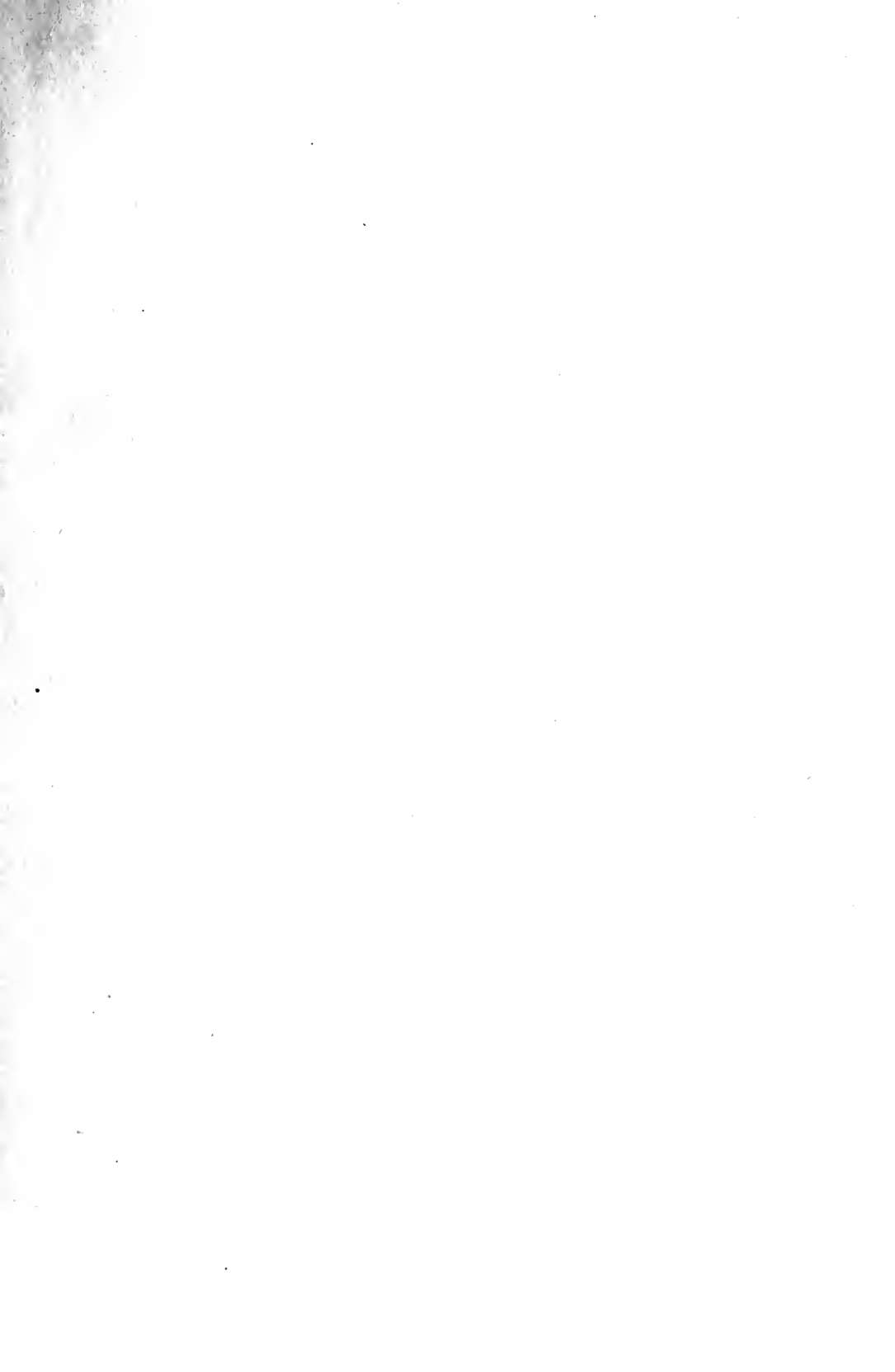


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ARCHIVES OF PEDIATRICS

A MONTHLY JOURNAL DEVOTED TO THE
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ORIGINAL COMMUNICATIONS

THE CHLOROTIC TYPE OF ANEMIA IN INFANTS AND CHILDREN.

By HERMAN SCHWARZ, M.D., and NATHAN ROSENTHAL, M.D.,
New York.

The fact that many cases of severe anemia are encountered in infants is a matter of common knowledge. Badly nourished children, or those developing rickets, frequently show all degrees of pallor. The ease with which children become anemic, through any one of many causes, is equally well known. However, of late years, the treatment of all types of infantile anemia, from whatever cause, has taken almost exclusively the form of addition of green vegetables and fruit juices to the diet. As is frequent in medicine, certain dietetic or laboratory principles,

deservedly popular, assume a complete preeminence at the expense of older and valuable methods of treatment.

It is our purpose to show (1) that a type of anemia corresponding in blood picture, at least, to the chlorosis of adults exists in infants and occasionally in older children, and (2) that the administration of iron, in this condition, meets with an excellent response.

Of the legion of causes which are responsible for infantile anemia, we shall consider here only those which produce a blood picture similar to that of chlorosis in adults. Therefore, the anemias due to acute or chronic loss of blood, helminthiasis, mineral poisons, malignant growths, rickets, syphilis and tuberculosis are excluded. Food, either too much qualitatively or quantitatively, or too little, as in voluntary or involuntary starvation, will be considered later. The anemia produced by a scanty supply of breast milk, or produced by too long continued nursing, may be excluded also, since, in these cases, the blood picture of chlorosis is usually not found. In the actual starvation of professional fasters the blood shows very little change from normal; the red and white blood cells may be slightly diminished and the blood volume increased; according to Tauszk¹ the hemoglobin is not necessarily diminished. Starvation in young animals at times has produced a chlorotic blood picture, and this factor may possibly have the same effect in very young infants.

The work of Bunge and his associates, especially Abderhalden, has shown that a diet containing but very little iron can produce in young animals a blood very similar to that of chlorosis; in older animals and adults, under similar conditions, however, this form of anemia is not produced.

The clinical features of this form of anemia in infants and children are not necessarily distinctive, and it requires a red blood count and a hemoglobin determination in order to discover its presence. Iron medication frequently produces the same brilliant results as it does in the chlorosis of adults, and for this reason we wish to present some of our observations, in order to show that, this type of anemia once demonstrated, iron administered in sufficiently large doses gives a rapid and remarkable result.

It is surprising how little this simple or perhaps essential anemia is described in our textbooks on children's diseases. The

literature is largely French, and to the French must be given the credit of calling attention to it.

In 1771, Sauvage described 5 cases of chlorosis, one of which was in an infant. Nonat², in 1860, thought chlorosis more frequent in infancy than at any other age. He described 68 cases, 47 girls and 27 boys; 3 cases being less than 1 year old. Several years later, Germain Seé also showed the occurrence of this form of anemia in infancy. Gueneau de Mussy (*Leçons sur la chlorose*) accepted chlorosis as occurring in infancy. Arochambeau, in 1882, described an anemia in infancy corresponding to the chlorotic type. On the other hand, Potain, Hayem, and Czerny considered that chlorosis existed only at puberty or later, and denied its occurrence in infants. Since then Halle and Jolly³ have given an excellent description, including the blood findings, of a case at an early age. Rist and Guilemot⁴ described similar cases under the name of oligosidermie. Petrone,⁵ in 1905, described several cases of chlorosis in young children. Since 1907 very little attention has been drawn to this form of anemia and no new cases have been cited. The condition, however, has been described from Finkelstein's clinic, by Kunkel, as occurring in prematures and twins.

Frequency: In order to illustrate the frequency with which this form of anemia is found in infants and children, it is only necessary to state that within a few months we have been able to collect 40 cases.

TABLE I

<i>Age When First Seen.</i>	<i>No. of Cases.</i>
Under 3 months	14
3 to 6 months	5
6 to 9 months	10
9 to 12 months	0
12 to 18 months	3
18 to 24 months	3
2 to 3 years	2
3 to 8 years	3

Age: The condition seems more common in early infancy than in any other period. This statement, however, is conditioned by the age when our children were first seen. The preceding table shows that of 40 cases, 14 were discovered earlier

than the third month; 29 were seen before the first year; 3, however, as late as the eighth year. Of the 29 cases occurring under one year, there is no doubt in our minds that the condition had existed a greater or shorter time before it was discovered.

Very often the appearance of the child does not lead one to suspect the presence of an anemic condition. In 18 of these 40 cases, blood examinations were not made until they had been under observation weeks or months. Cases of this type probably begin in early infancy and do not become apparent until the children are between 12 and 16 months old.

Etiology: From an analysis of our cases, made as we were collecting them, it soon became apparent that this form of anemia occurred in premature children, in twins, and in those who had a rather stormy feeding history during the first 3 months of life. In cases of children with such a history, although without any appearance of pallor, examination of the blood often showed this type of anemia. Three cases at birth weighed below 4 pounds; 8 cases at birth weighed between 5 and 6 pounds; 5 were prematures and 4 were one of twins. In 20 of the 40 cases, there was a feeding history of a stormy nature. Nine cases, however, did very well on the breast. Constipation was not a factor.

Diet: Of 28 cases, of which we could get a history of the feeding for the first 3 months, 14 had the breast alone, 10 had breast and bottle, and 4 the bottle alone. The feeding in the older children was in most instances a rational one, being fairly mixed. In a few cases, however, the condition seemed to be definitely in connection with the feeding: in one case, an 18 months infant had been treated for a number of months on a salt-free diet; another, a 2½ year old child, was still on a fluid diet fed from the bottle.

Sex: Of our cases, 28 were boys and 12 girls. This is the reverse of that found by Nonat and certainly does not coincide with the chlorosis of adults, which almost never occurs in the male. In 13 cases, cited by Leenhard, 8 were boys and 5 girls. However, this is of little importance because with more cases the proportion may possibly change.

History: At times there was a family history of chlorosis, or other forms of anemia, although this was not usually the case.

The children were brought to us either for feeding or general follow-up work. There were no special symptoms; occasionally loss of appetite or capricious appetite; rarely constipation. Intestinal derangement was not a common feature.

Clinical Examination: These children presented one of 2 types; the first, premature, congenitally weak, usually under weight; the second, one with a good panniculus adiposis, well fed and happy. Pallor was in some cases marked, in others hardly discernible. The color was rather a grayish than a whitish yellow or waxy. The mucous membranes were pale but never excessively white. Eczema or other manifestations of exudative diatheses were absent.

Physical Examination: Apart from the general types, nothing was characteristic. Systolic murmurs were present in only 3 of the entire series. The spleen was only rarely felt.

Blood Examination: The examination of the blood in these cases shows that the hemoglobin* is greatly diminished but the red blood count rarely falls below 3,000,000 and is more frequently between 4 and 5,000,000. There is a great disproportion between the number of red blood cells and the hemoglobin. The index is always less than 1.0, and usually between 0.4 and 0.6. The leucocyte count ranges between 6 and 10,000, with a differential count presenting no deviation from the normal. A tendency to lymphocytosis is noted at times, but this is difficult to judge accurately on account of the tender age of some of the children. The red cells occasionally show poikilocytosis and anisocytosis. Nucleated red cells are rarely found. Blood platelets range between 200,000 and 300,000. Blood volume was normal in 5 cases, estimated by means of Epstein's method.

Iron Metabolism: In 2 of our cases an iron metabolism experiment was made. Case I, premature, weight at birth, 3 pounds; at 11 months, the time at which our metabolism experiment was made, his weight was 19 pounds, 4 ounces, his hemoglobin was 50 per cent and the red blood count, 4,140,000. He was given the following diet: whole milk, 32 ounces; barley water, 8 ounces; milk sugar, 1 tablespoonful; farina, twice a day. The results are seen in the table below:

*The hemoglobin estimation was done with Kuttner's apparatus. The standard color tube is equivalent to 15 gr. of hemoglobin per 100 c.c. of blood when the color matches this at 100 on the scale of the calibrated tube. Kuttner, Jour. A. M. A., 1916, Vol. XLVI, 1370-1373.

	<i>Iron</i>	<i>Nitrogen</i>
Total intake, 3 days.....	7.81 mg.	15.212 gm.
Output—		
Feces	7.44 "	1.537 "
Urine	0.8 "	10.633 "
Balance	—0.43 "	+3.042 "

Case II, a boy of 2 years, with moderate degree of pallor, hemoglobin 50 per cent, red blood count 4,704,000, was given a general mixed diet during a 3-day metabolism experiment. We realize fully that 3 days is probably much too short a period, but circumstances were such that an extension of the time was impossible.

	<i>Iron</i>	<i>Nitrogen</i>
Total intake, 3 days.....	11.42 mg.	22.381 gm.
Output—		
Feces	14.036 "	0.616 "
Urine	0.6 "	17.364 "
Balance	—3.21 "	+4.401 "

From these two cases it will be seen that the nitrogen balance showed a retention of 3 to 4 gm., whereas the iron balance was negative in both instances.

In the discussion of these results it might not be inadvertent to review briefly some of the chemistry of hemoglobin and its bearing upon the iron metabolism.

Hemoglobin can be split up very easily into a protein portion, called globin, and an iron containing substance called hemocromogen. On the addition of glacial acetic acid, 100 gm. of hemoglobin yield about 4 gm. of hemocromogen. Loosely combined with oxygen, hemoglobin changes into oxyhemoglobin. Oxyhemoglobin split up yields globin and hematin. By the action of sodium chloride and glacial acetic acid, hematin can be further split up into hemin, which contains four pyrrol rings to which the iron molecule is attached. The action of hydrobromic acid on hemin reduces it to hematoporphyrin, which does not contain iron. Hemopyrrhol is the final end product.

In 100 gm. of ash in the newborn there are about 0.8 gm. of Fe_2O_3 ; 38 to 40 per cent of this iron is in the blood; the remainder is deposited in the tissues (Hugounenq). The actual amount of hemoglobin in the body rises from birth, but the amount as com-

pared with the body weight diminishes. The amount of iron deposited in the tissues, especially in the liver of the new-born, diminishes soon after birth. In other words, the iron in combination with hemoglobin, or the hemocromogen radical, increases from birth, but the iron not so combined (reserve iron) diminishes. It is thus easy to understand why the new-born should have such a large amount of hemoglobin and reserve iron, and that this hemoglobin iron should increase, for the great extent of body surface in the new-born requires a large amount of oxygen-carrying material. Therefore a great amount of hemoglobin must be manufactured. The hemoglobin iron is increased at the expense of the non-hemoglobin iron.

The next question that comes before us is that of the absorption of inorganic iron. Can it really be absorbed? By giving inorganic iron, for instance, the urine shows no increase in the excretion of iron. It has been shown, however, that iron injected intravenously produces a marked increase in the intestinal excretion of iron. It has been further proven that inorganic iron is easily taken up by the small intestine, the lymph channels, the leucocytes and probably the lipoids (McCabe). It can be followed to the liver and other organs and shown to be excreted into the large gut, often at the site of Peyer's patches. Thus it is absorbed in the same manner as is calcium, taken up by the small intestine and excreted into the large intestine. But this does not necessarily mean that the iron is used in the organism, for bismuth and silver can be followed in a similar manner. How then can it be proven that the iron given per os is really used in the organism? The answer is still in doubt. In order to produce hemoglobin, pyrrhol derivatives are necessary for the cromogen. Tryptophan is possibly needed for the pyrrhol rings. In milk, however, there is very little or no tryptophan. In changing the diet, different amino acids are taken in, so that more substances are absorbed which may help in the formation of hemoglobin.

The iron for the pyrrhol rings must be obtained from compounds easily broken up; that in the food must be removed from its combinations in order to be attached to the pyrrhol rings and make up the hemocromogen or its oxygen equivalent hematin. This may take place in the liver, in the spleen, in the bone marrow or in the lymph; furthermore, the protein portion of the

hemoglobin, namely the globin, must be obtained. This protein is made up principally of the amino acid histidin, which is not present in milk and must first be synthesized. Then only can the globin and the hemocromogen combine, and hemoglobin be formed. There still remains the formation of the stroma of the red blood cells, and the hemoglobin has yet either to be taken up by the stroma or produced by it. Only then is hemoglobin represented as a functioning part of the body, and available for the carrying of oxygen.

From the foregoing it will be seen that hemoglobin metabolism, if one may use this term, cannot be solved from the standpoint of the iron metabolism, for any of the links of the chain thus described may be broken and so cause one or another form of anemia.

Very little work has been done on the iron metabolism in anemia, but a number of experiments by von Noorden showed that in cases of chlorosis the iron balance may be negative. How much importance can be laid to this may be judged from our short résumé of the hemoglobin metabolism. That the iron balance has something to do with the hemoglobin is undoubted, but just how much, is unknown.

The etiology of this type of anemia in infants is still obscure. A perusal of the histories shows that the prematures, the congenitally weak, twins, those born with low birth weights, and those having difficulty in the nursing hygiene during the first few months, have a predisposition for this form of anemia and develop it with great regularity. The hemoglobin of the child born at term is between 125 and 150 per cent. In the premature and twins, however, the hemoglobin often ranges much higher, and sinks much more rapidly, so that within an even shorter time than in the normal child the hemoglobin has dropped to 50 or 60 per cent, the red blood cells behaving no differently from those of a full term infant. The exact cause of this great fall in the hemoglobin of the premature and twins has been only imperfectly explained by Hugounenq. He showed that the greater proportion of the salts, calcium, iron, etc., are deposited in the fetus in the last 3 months of pregnancy. The premature, therefore, fails to get the required amount of iron deposited in the liver, and brings into the world a diminished iron depôt. Twins, having to divide the

salts that the mother can deposit, also show this deficiency. This may explain why twins and prematures regularly become anemic and rachitic. In fact, we have been able to prevent this anemia and rickets in prematures and twins by the regular and early administration of iron and cod liver oil.

Work is in progress to show whether there is a real or apparent iron and calcium deficiency in these cases. The amount of iron deposited in the last three months of pregnancy is two to three times as much as that of the first six months. Therefore it is easily conceivable that a child, bringing a diminished iron depôt into the world, uses it up, cannot replenish its hemoglobin from this source, gets little or no help from its food, and becomes anemic. Increase in hemoglobin has been achieved in a few of these cases, reported elsewhere, simply by placing the children in the fresh air, without any change in diet, so that this congenital deficiency of iron alone, may not explain the condition. However, on the other hand, our results with fresh air have been anything but brilliant. The amount of iron deposited in the body may not be the sole fault; there may be a break in this complex chain which we have designated as the hemoglobin metabolism. The clinical experiment tends to demonstrate that deficiency of iron in the body is a great factor.

Other Causes: Constitutional dyscrasia, such as the exudative diathesis, neuropathic tendencies, and so forth, seem to play but a small part in this type of anemia. Gastrointestinal conditions and dietetic errors may be factors as seen in two of our cases: in one of these nephritis was suspected in a 14 months old baby and for 2 months an almost salt-free diet was instituted; at the end of that time the child had a hemoglobin of 48 per cent and a red blood count of 4,920,000. In a second case, a 2½ year old child, weighing 17 pounds, had never had solid food. This child received thin cereal, 2 eggs and more than one quart of milk, by means of the bottle. Its hemoglobin was 40 per cent, its red blood count 5,550,000. This case was given a more consistent diet and large doses of iron. Within three weeks the child's hemoglobin was 56 per cent, the red blood count 4,520,000, although it was still impossible to induce the child to take any solid food, the only change in the conditions being the administration of iron. Blood volume was normal. The absence of signs of rickets in many

instances, and the relatively few cases with enlarged spleens, exclude syphilis or general infections as an etiological factor in this type of anemia. When one observes the apparent well being, the increase in weight, the good appetite and excellent stools, yet withal the increasing pallor, one is forced to acknowledge that there is some factor present in addition to the diet.

How long this condition may exist, whether it may continue into the real chlorosis of puberty, we cannot as yet say; that it may continue as long as 6 or 8 years some of our cases show; that they tend to get well themselves we have clinical proof; that the administration of iron often improves the general condition, the appetite, the weight and especially the appearance, can easily be proven. Increase of 20 and 30 per cent within a few weeks are readily achieved.

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MONGOLIAN IDIOCY (Journal A. M. A., Jan. 10, 1920). First noticing the almost universal observation that Mongolian idiocy occurs only in one member of a family, Irving H. Pardee gives the history of a family of Italians with eleven living children. The parents were intelligent and rather above the average of Italian immigrants and the children normal, excepting the two youngest, aged, respectively, 7 and 4 years, who presented the characteristic picture of Mongolian idiocy. There was no specific history or evidence of such disease. The family history supports the view that such cases develop from a parent in whom the germ plasm has become defective through exhaustion. The history of over half the reported cases of Mongolian idiocy, so far as obtainable, showed that the idiot child was the last one of a large family. While similar features of Mongolian idiocy and myxedema have been emphasized of late and made the basis for thyroid medication, no results so far have been obtained. In the family here in question there is a strong endocrine heredity, especially on the maternal side, but medication along these lines has so far failed. Further work will probably throw some light on this possible etiologic factor.—*Journal A. M. A.*

PNEUMONIA IN INFANCY AND CHILDHOOD WITHOUT PHYSICAL SIGNS.*

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The question whether a real pneumonia can exist in the chest without physical signs has long been discussed. The possibility of making a positive diagnosis of pneumonia without physical signs is not definitely stated in most textbooks. The author, however, of one of our best textbooks on pediatrics, Edmund Cautley of London, says: "Definite physical signs may be slight, delayed until the fourth or fifth day, not present until after the crisis, absent throughout, or missed because they are so deeply seated. Central pneumonia is frequent in children, especially in the upper lobe, and the physical signs may be limited to persistent rapid breathing and high fever."

This would seem to be correct excepting for the statement that definite physical signs fail because the lesion is deep-seated, for, as I shall show by roëntgenograms, they sometimes give no signs when they are peripheral and not central.

The best opinion is that in children a positive diagnosis of pneumonia can be made without the presence of physical signs in the chest when there exist several of the following symptoms: fever, overactivity of the alae nasi, a pneumonic type of respiration with a pause at the end of inspiration accompanied by expiratory grunt, a relationship between respiration and pulse approximating 1 to 3, and particularly if there is the added sign of rigidity of the upper extremities with no rigidity of the lower extremities, an effort on the part of the child to protect a sore chest. Notwithstanding this fact it is not uncommon in consultation with prominent men to have surprise expressed on stating the opinion that a pneumonia can exist without physical signs.

There is one type of case in which this is a matter of great importance: children who have acquired a respiratory infection in which the ears have become involved and have been opened, the temperature persists high, and there is a question whether a mastoid operation should be done or not, the local condition not indicating necessarily a mastoid. The pediatricist examines the

*Read at the seventieth annual session of the A. M. A., Section on Diseases of Children, held at Atlantic City, N. J., June 11, 12 and 13, 1919.



FIG. 1.—Case 1. X-ray showing a peripheral consolidation of the right thorax.

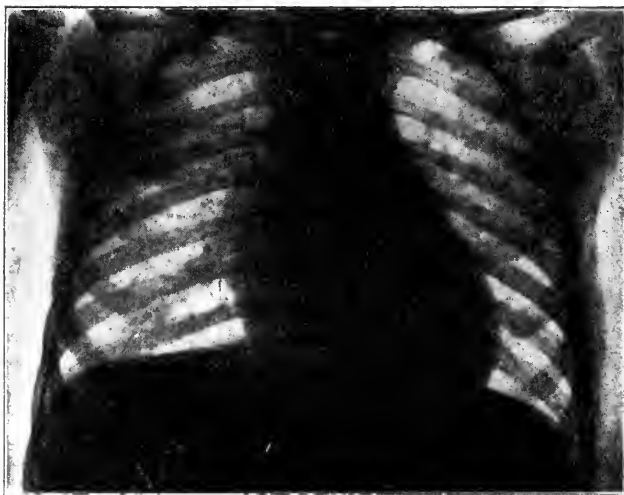


FIG. 2.—Case 1. X-ray taken 3 days after Fig. 1, showing partial absorption of the consolidation.

chest for signs of pneumonia without finding any indications that would locate a consolidation, but the ear specialists are not apt to be satisfied that there is a pneumonia present unless the physical signs can be demonstrated.

Since the adoption of the routine use of the roëntgen ray in hospital cases, pneumonias have been discovered when no physical signs of their existence have been found, and even after their demonstration by roëntgen ray and the determination of the pneu-

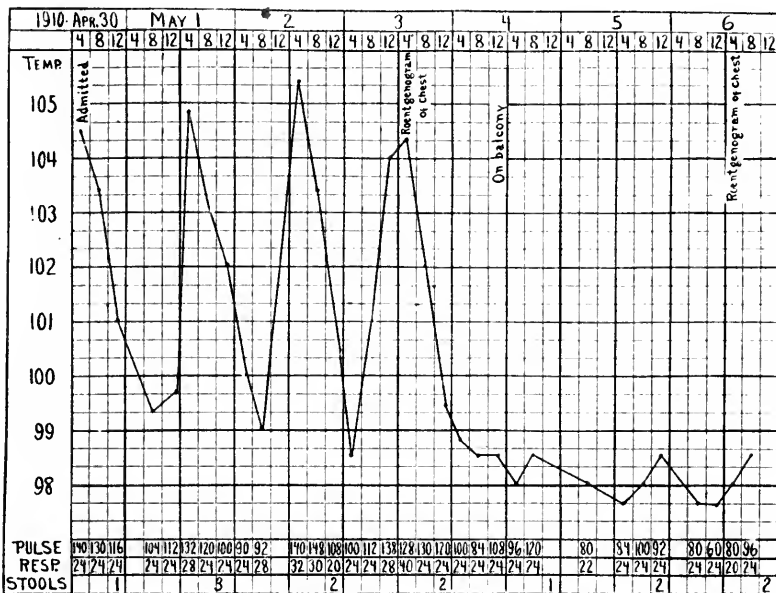


FIG. 3.—Temperature chart and record of pulse and respiration of Case 1. It should be noticed that neither the pulse, respiration, nor their relationship would lead one to suspect pneumonia.

monia, subsequent physical examination has proved entirely negative.

It seems important, therefore, to demonstrate, as far as possible, the existence of such cases without physical signs, in view of the fact that, at the present time, it is often difficult and impossible to obtain satisfactory roentgenograms of sick children in private homes.

There is urgent need of a roëntgen-ray apparatus which can be used in private houses without the great expense at present involved in such roëntgen-ray work.

The first case is one to which I referred in a previous article,* a child who had entered the Roosevelt Hospital with a remitting temperature. The respirations recorded were usually below thirty, and there were no physical signs in the chest, nor was there any other cause for the temperature found until a roëntgen-ray plate of the chest was obtained. This gave a very definite shadow of pneumonia situated apparently beneath the right axilla. The



FIG. 4.—X-ray of Case 2 on admission to the hospital, showing consolidation in the right thorax.

day after the first roëntgenogram was taken the temperature remained normal and three days later another roëntgenogram of the chest showed a diminishing shadow. It is interesting to note that this consolidation was apparently connected with the root of the lung.

The second case was seen by me in consultation and gave a history of sudden onset; there had been a temperature ranging from 100 to 105° F. each day for four days. There was no

*Freeman, R. G.: The Value of the x-ray in Intrathoracic Lesions in Children, *ARCHIVES OF PEDIATRICS*, XXXII: 891 (Dec.) 1915.

marked evidence of catarrhal inflammation and no physical signs were found over the chest, although the physician in charge stated that he had heard some râles over the right base on a previous visit. The following night the child's temperature rose to 106.5° F., receding in the morning to 99° F., and the next night the temperature rose to 107.5° F. The following morning the child was brought to the Roosevelt Hospital, where a roëntgenogram of the chest showed a shadow beneath the right axilla. The roëntgenologist thought it looked more like fluid than pneumonia, and on two successive days a large needle was inserted in the

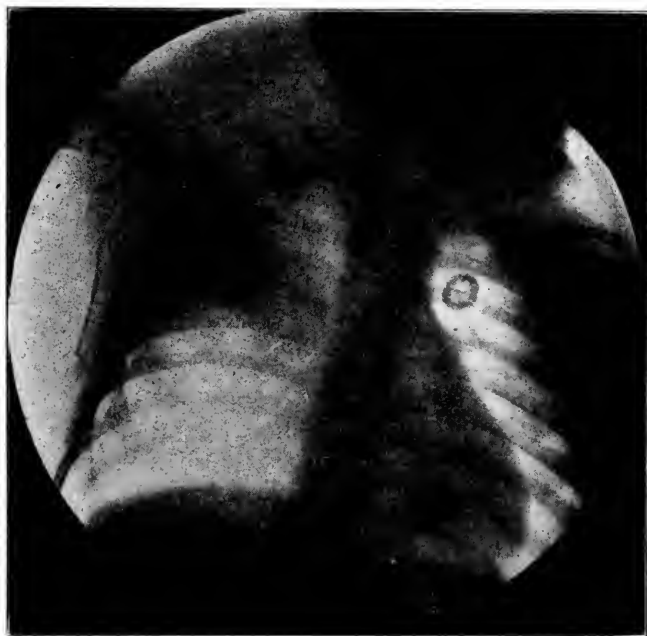


FIG. 5.—X-ray of Case 2, the day following admission to the hospital, showing a diminution in the area of pneumonia.

area involved, but no fluid was obtained. The temperature, however, dropped rapidly so that it reached normal in two days, and a roëntgenogram five days after admission showed the shadow clearing. This child at no time showed any physical signs over the area involved, although examined by several physicians. The respirations, moreover, were never more than normal.

One questions why a pneumonia involving a small area of the



FIG. 6.—X-ray of Case 2, 5 days after admission to hospital, which shows only a small area of consolidation remaining.

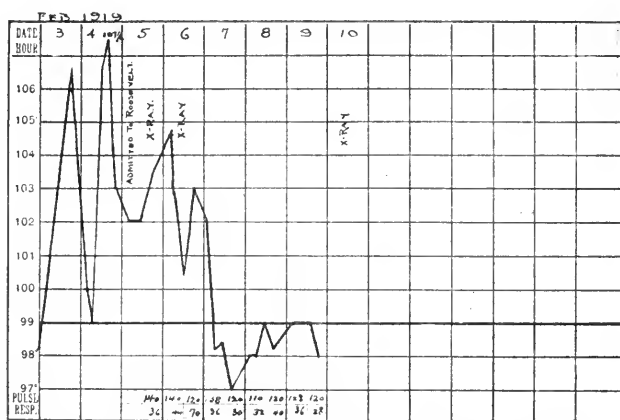


FIG. 7.—Temperature chart of Case 2, showing the very high temperature recorded, with the respiration only moderately increased in number.

lung, such as this, should be accompanied by a temperature on one night of $106\frac{1}{2}^{\circ}$ F. and on the following night of $107\frac{1}{2}^{\circ}$ F., with rapid recovery as soon as the child was brought to the hospital. The only explanation I have to offer is that until he was brought to the hospital he was being medicated every fifteen minutes day and night by a homeopathic physician and thus was not allowed to obtain the rest he needed.

The third case was recently admitted to the Roosevelt Hos-

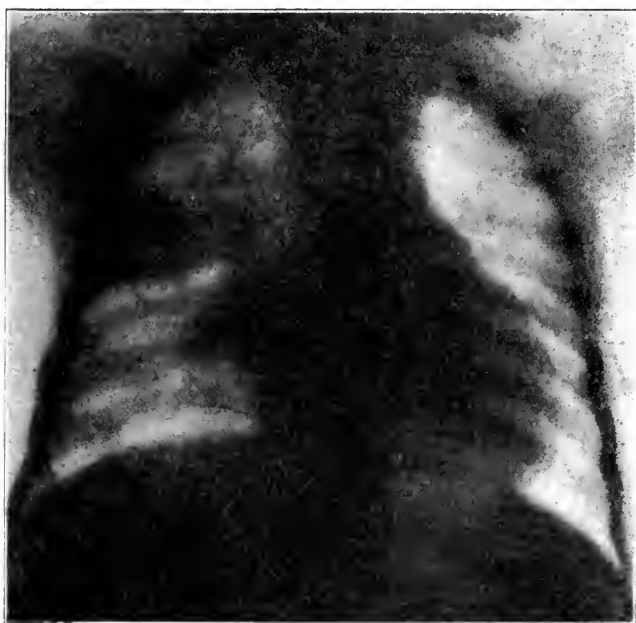


FIG. 8.—X-ray of Case 3, showing the shadow in the outer portion of the thorax.

pital with a history of bronchitis for four weeks, and the patient was quite sick for twenty-four hours with fever and cough. A member of the staff on going over the child on admission reported some signs over the right upper lobe, but when I went over the case with him later neither of us could find any signs at all. The roëntgenogram showed a consolidation in almost the same area as the two preceding cases, and after the roëntgenogram was seen we both went over the child again with negative findings. After forty-eight hours in the hospital a throat culture positive for the

Klebs-Löffler bacillus was found and the child was transferred to a hospital for contagious diseases.

An interesting point about these cases is that they all involve approximately the same portion of the right lung, and, as the consolidation in none of these cases runs up to the apex, it might be considered an involvement of the right middle lobe. If, however, it was the right middle lobe it should have been possible to obtain signs over the anterior portion of the chest, and it seems to me much more probable that the involvement was of the right upper lobe and that the signs were obscured because in order to hear them one would have to listen through the right scapula. It is most remarkable that they gave no signs in the axilla.

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HUMAN SERUM IN TREATMENT OF INFLUENZA BRONCHOPNEUMONIA (New York Medical Journal, April 19, 1919). Under the jurisdiction of the United States Naval Hospital at New York, 842 cases of pneumonia have been treated by E. W. Gould and others. Three hundred and twenty have come under Gould's immediate supervision at the Naval Hospital. The mortality rate among these 320 cases has been 26.16 per cent. Many of the patients were in an advanced stage of the disease or even in a moribund condition on arrival at the hospital. Thirty cases of so-called influenza pneumonia were treated by the use of human serum from convalescing patients with a loss of only two cases. The rapid and complete subsidence of symptoms unusual in most cases of influenza pneumonia gave hope that a specific line of treatment had been found. The author was able to confirm the contention of Redden that the amount of lung involvement in the donor is necessarily a reliable criterion in determining the value of his serum. He is impressed with the belief that the human serum from convalescent pneumonias undoubtedly contains valuable antibodies, and that its use in cases infected with homologous strains will give satisfactory results; but with the present limited ability to isolate the infecting organisms of the donor and the recipient, the method cannot yet be placed on a practical basis where definite results can reasonably be expected. Furthermore, this method cannot be used except in large, well equipped hospitals where access can be had to many willing donors.—*Journal A. M. A.*

AN EARLY DIAGNOSTIC SIGN IN BASILAR MENINGITIS

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The difficulty of making a positive diagnosis of tuberculous meningitis in the early stages of that disease is recognized by all. In the majority of cases the onset is very gradual, the symptoms vague and indefinite. The child may give no signs other than those of some digestive disturbance for days, sometimes weeks. The diagnosis is especially difficult in young infants, since the yielding cranium keeps the intracranial pressure below the fatal limits, and very often weeks will pass before any definite signs appear.

A symptom that has served me well during the past 7 years as an aid in making an early diagnosis of basilar meningitis is what, for want of a better name, I should call a "reflex" strabismus. By flexing the head on the chest, either a bilateral or a unilateral internal strabismus develops, which will last as long as the head is kept in flexed position, and disappears as soon as the head is relaxed. In many cases the strabismus is accompanied by a retraction of the upper eye lids. In some cases I have also noticed a contraction of the pupils. This "reflex" strabismus was present in the early stage of almost every case that came under my observation in the past 7 years. In the late or paralytic stage flexion of the head failed to produce a strabismus.

The "reflex" strabismus, above described, proved, in my experience, to be such a reliable symptom that I have often made a diagnosis of basilar meningitis days before any other meningeal symptoms appeared. The following case will serve to illustrate:

Baby Gertrude C., 11 months old. First saw case December 14, 1918. Family history negative. Both parents healthy. Four brothers and sisters healthy.

Personal History.—Normal delivery at full term. Breast fed. No previous illness.

Present Illness.—Began December 12, with cough and temperature. No vomiting. Dr. S., who saw the child several times, thought it a case of influenza.

Physical Examination.—Child well nourished, face flushed, head normal. Anterior fontanelle normal, no bulging. Pupils normal. No retraction of head. Abdomen slightly distended.

Oral Examination.—A slight congestion of pharynx and tonsils. Tongue coated.

Heart negative. Pulse 110.

Lungs—Respiration, 40; few scattered moist râles.

None of the recognized symptoms of meningitis were present.

By flexing the head on chest to elicit neck signs, a double internal strabismus developed. I did not hesitate to make a diagnosis of basilar meningitis, although there were no meningeal signs other than the above described "reflex" strabismus.

December 15—I again saw the child and found no material changes. Temperature 102° F., pulse 120, respiration 36. A double internal strabismus on flexion of the head was present. No other sign of meningeal involvement.

December 17—Had the child transferred to my service in the Wyckoff Heights Hospital. It then had a slight rigidity of the neck, a "reflex" strabismus, and a Babinsky on the right side. All other recognized symptoms of meningitis were absent. By lumbar puncture, 10 c.c. of a clear fluid was removed. No tubercle bacilli found in that fluid.

December 19—The child developed a marked facial paralysis. The rigidity of neck disappeared as well as the "reflex" strabismus on flexing head. Another lumbar puncture was made and 28 c.c. of a slightly turbid fluid removed; tubercle bacilli found. Child died January 1, 1919.

Although I could cite many cases similar in character to the above, I fully realize that the number of cases observed by me will not warrant extravagant claims for this early "reflex" strabismus. However, to me it has been of such inestimable value in making a diagnosis of basilar meningitis days before the recognized symptoms appear that I feel justified in bringing it to the attention of the medical profession for further observation.

What appeals to me as a reasonable explanation of this early "reflex" strabismus is that by flexing the head we suddenly increase the already increased pressure at the base. This causes either pressure on the abducens with a paresis of the external rectus, or it causes pressure on the oculomotor nerve with a spasm

of the internal rectus. The last mentioned theory will also account for the action of the levator palpebrae and the myosis noted in some cases.

The many textbooks referred to below failed to reveal any mention of above described "reflex" strabismus. Strabismus is generally referred to as a late manifestation in basilar meningitis. Holt says, "occasionally there is a strabismus." Fischer says, "strabismus as well as facial paralysis are frequently seen as evidence of paralysis." Chapin and Pisek speak of strabismus and ptosis as usually appearing in the final stage. Dunn mentions strabismus as an occasional symptom. Griffith says, "paralysis of the movements of the eye balls is common, either of oculomotor or abducens." Koplik mentions the presence of palsies of intracranial nerves as indicative of a lesion at the base of the brain.

Dr. M. Thiemich, of Breslau, in his description of tuberculous meningitis, mentions lesions of the oculomotor and abducens nerves as a late manifestation, occurring in the second stage of the disease, due to pressure. None of above quoted authors mention how these lesions of the abducens and oculomotor can, by flexing the head, be brought out in the early stage of basilar meningitis, long before there is sufficient pressure to produce paralysis.

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PLASTIC PERITONITIS (*Archives de Médecine des Enfants*, Paris, October, 1919). L. Morquio has encountered at Montevideo 4 cases in which a child developed acute peritonitis, and a certain region in the abdomen swelled and became painful. Instead of the anticipated suppuration, however, the hard tumor and the pain subsided, and another patch developed at some other point. The disease progresses by waves in this way, but spontaneously subsides at last by the end of the third month, and the children seemed to be healthy when examined up to 10 years later. The ages ranged from 3 to 13. In one case an operation was done for the assumed appendicitis but the appendix seemed to be normal. In another child, infection from the genitals seemed probable; in another the process started in the sigmoid region. But in all the peritoneal picture was the same. The complete and permanent recovery excludes tuberculosis.—*Journal A. M. A.*

DIPHTHERIA PREVENTION.*

By DEVER S. BYARD, M.D.,

New York.

The state epidemiologist of Massachusetts some months ago writing of diphtheria strikingly titled his publication "Diphtheria the Uncontrolled." The disappointing degree to which modern methods have offset the old statistics of its occurrence perhaps prompts this wide-flung challenge, and certainly warrants our own inquiry as to our competency in the important medical responsibility of diphtheria prevention.

Some statistical briefs compel our interest. The last census report for the registration area in the United States gives for that year (1916) the total deaths from all causes as 1,100,921—14 per 100,000. The deaths under 1 year were 164,660 (16.4 per cent of total deaths). Of children under 5 years 234,081 died (25.4 per cent of the total deaths). Diphtheria killed 10,367 (over 1 per cent of the total dead); 908 under 1 year, 1,696 at 1 year, 6,532 under 5 years.

Of the total deaths under 5 years, diphtheria contributed approximately 3 per cent of the victims, and of the total fatalities from this disease nearly 65 per cent were in children less than 5 years old. Accepting the average mortality rate as a factor for conservative reckoning, we estimate that there were approximately 110,000 ill of diphtheria in the registration area in this year, and over 250,000 in the whole United States. Of these nearly 175,000 were in the child group before the fifth year. Diphtheria causes approximately as many deaths in the United States as either of the diseases, whooping cough, measles, or scarlet fever. It is estimated that the average fatalities in the United States from these diseases for the period 1916 to 1918 were: Diphtheria 19,150, whooping cough 10,200, measles 9,500, scarlet fever 8,200.

The actual death rates severally for the United States registration area of these diseases were:

Disease	1914		1915		1916		1917	
	Deaths	Rate per 100,000	Deaths	Rate per 100,000	Deaths	Rate per 100,000	Deaths	Rate per 100,000
Diphtheria	11,786	17.9	10,544	15.7	10,367	14.5	12,453	16.5
Measles	4,461	6.8	3,409	5.4	7,947	11.1	10,749	14.3
Scarlet Fever	4,340	6.6	2,419	3.6	2,355	3.3	3,157	4.2
Whooping Cough.....	6,816	10.3	5,421	8.1	7,284	10.2	7,817	10.4

*Read at the meeting of The Hospital Graduates Club, October 23, 1919.

The United States Public Health Report for July 4, 1919, states that the summary of the Census Bureau Mortality Statistics for 1917 shows that: "Next to that for influenza, the highest rate appearing for any epidemic disease in 1917 was for diphtheria, 16.5 per 100,000, representing 12,453 deaths."

Sixteen per cent of all deaths from 5 to 9 years are caused by diphtheria. The administration of antitoxin has reduced the mortality of diphtheria in 25 years nearly 75 per cent.

DEATH RATE FROM DIPHTHERIA PER 100,000 POPULATION IN U. S. REGISTRATION AREA.

1900	1905	1910	1915	1916	1917
43.3	23.8	21.4	15.7	14.5	16.5

The Schick test has made the use of antitoxin in exposed subjects an intelligent and impressive procedure. As a preventive its use, however, is limited, the duration of its protection being uncertain, though certainly transient, an average immunizing dose probably lasting 3 to 4 weeks. In spite of this valuable agent, and beyond any effective control through quarantine, intensive culturing, etc., there has been during the period of antitoxin administration in the United States only an approximate 30 per cent occurrence reduction in this disease, the last four years showing an estimated occurrence reduction in the United States of less than 8 per cent.

State	1914		1915		1916		1917		1918	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Conn.	2,662	228	2,161	193	1,870	187	2,367	224	2,348	201
Mass.	8,080	652	9,282	721	7,282	557	10,322	836	6,921	594
New Jersey ..	7,378	611	6,941	501	5,580	444	5,326	447	4,465	485
New York ..	22,537	2,006	20,806	1,754	10,133	1,518	19,183	1,745	16,501	1,772

Vital statistics constantly challenge our methods, but the continuing frequency and mortality of this preventable disease insistently reproach our practice. An arraignment of preventive neglect confronts us in the records of our own Greater City of New York, and warrants restatement of figures available and probably familiar.

The average number of cases of diphtheria in New York from 1905 to 1913 is recorded as 17,281. For the 3 years, 1913-1915, inclusive, the average was 15,641. For the years 1916-1918, inclusive, 12,520. In 1917 there were 12,624 cases. Of these 1,158, or 9.7 per cent, died—133, or 10.5 per cent, under 1 year, 150 at 1 year. That is, 23 per cent of the total mortality were in those under 2 years of age, 842, or 65 per cent, under 5 years. For

this present year, 1919, for the period January 4 to September 20, 10,226 cases have occurred. Nine hundred and seventy-one have died—96 under 1 year, 206 under 2 years, 407 between 2 and 5 years, 213, 5 to 15 years—a total of 719, or 75 per cent, before the fifth year, approximately 25 per cent at or under 2 years.

DIPHtheria IN NEW YORK CITY 1912-1918.

Year	Cases	Deaths
1912	15,269	1,125
1913	14,535	1,333
1914	17,129	1,489
1915	15,279	1,278
1916	13,521	1,031
1917	12,584	1,158
1918	11,455	1,245

In this city, favored beyond others by the initiative and competency of our research laboratory in its investigation and management of the diphtheria problem, our last 4 years have shown no considerable occurrence reduction, and we maintain a mortality record averaging 10 per cent. Two babies and 1 slightly older subject die here each day of this disease. Beyond its economic waste, one reckoned medical item being the loss through quarantine of over 1,700 days attendance in hospitals, day nurseries, etc., this preventible disease contributed 1½ per cent of the total deaths last year in our country—3.25 per cent of those who died were under 5 years.

For the prevention and control of diphtheria, all the needed information and agents are at hand. With every exclusion properly taken, the purport of these statistics is our—the community physicians'—outstanding neglect. Beyond doubt we have not adequately utilized this available means for prevention, viz: the toxin-antitoxin inoculation for active immunization of those susceptible to this disease. This agent has been made possible through the researches of Dr. Park and his associates. His and Dr. Zingher's reports of their extensive experimental and clinical use of it have shown its safe dependability for general administration. Its therapeutic use is the result of an extended series of investigations as to the possibility of safely producing antitoxin in a human through the injection of the combination of diphtheria toxin and antitoxin. In this, the mixture, although the toxin has been so neutralized as to be no longer poisonous, still contains some toxin in loose combination. To this antigen the body responds by a continuous production of antitoxin. As furnished by the Research Laboratory of the Health Department and by

several dependable firms, 1 c.c. of the mixture represents approximately 3 to 5 L plus doses of toxin either neutralized to the guinea pig; that is, containing 65-70 per cent L plus dose to each unit of antitoxin, or as recommended by Drs. Park and Zingher slightly toxic that is, 80-90 per cent L plus to each unit of contained antitoxin. The dose is $\frac{1}{2}$ c.c. for those under 1 year, 1 c.c. for subjects 1 year and over. Three subcutaneous injections are given at weekly intervals.

Interest is assumed in a brief resumé from the reports of Drs. Park and Zingher. Nearly 5,000 subjects have been inoculated. Of this number, within the last year, 2,100 were infants, 500 infants and children at milk stations, 700 in the schools. Three injections furnish most satisfactory results. About 30 per cent become immune at 3 weeks, 95 per cent in 8 to 12 weeks. Dr. Park believes that between 95 and 97 per cent of susceptible individuals will thus be effectively protected, and if a small per cent failure occurs in the first series that immunity may be conferred to these through later inoculations. Tests to date covering about 4 years show the protection thus gained to be effective, and it is hoped in producing this immune state that a continuous process of antitoxin bearing activity is established and that a life protection against diphtheria has been secured. Full doses of antitoxin at the time of inoculation and an exceptionally high grade of material immunity found in some infants may alter the operation of the injection. This need not be considered an obstacle to its administration to infants, for Dr. Park has reported that of 50 infants who received toxin-antitoxin within the first few days of life, when 85 per cent have maternal immunity, 8 months later 70 per cent of these were still found immune to diphtheria, where the ordinary expectation of immunity would be only 30 per cent. In 10 to 20 per cent of subjects, a slight constitutional reaction, with varying temperature and mild indisposition, appears within the first and third days. Local reactions to the inoculation are slight swelling, sensitiveness and varying slight or larger areas of redness. In general both these reactions are inconsiderable in severity. The most marked expressions are in those presenting pseudo-reaction to the Schick test; that is, older subjects. In the infant and young child reactions are rare and really mild, the presumption being that at this early age they have no hyper-sensitiveness to the protein of the diphtheria

bacillus. Assured of the harmlessness and efficacy of active immunization, the problem of diphtheria prevention and control is the determination of susceptibles and their active immunization. An antitoxin content of $1/30$ of a unit to each c.c. of blood is reckoned as affording individual immunity. The Schick test, reliably indicating the presence or absence of this protection, eliminates unnecessary procedure. Dr. Park's findings show that the expectation of the Schick test as performed in young subjects is at 3 months 15 per cent are susceptible; at 6 months to 1 year, 60 per cent; at 1 to 3 years, 70 per cent; at 2 to 3 years, 60 per cent; at 3 to 5 years, 40 per cent; at 5 to 10 years, 30 per cent. With such gradual accumulation of immunity, the adult liability to diphtheria sinks to be less than 15 per cent.

These Schick determinations parallel all vital records as to the age incidence of diphtheria and emphasize particularly the susceptibility of the child of the first 5 years, the pre-school group.

Confirming the dependability of the Schick test, Dr. Zingher reports that more than 1,200 patients, suffering from scarlet fever, giving a negative Schick reaction, were admitted to the Willard Parker Hospital, and that although none of these received either active or passive immunization not one developed clinical diphtheria, although from 15 to 20 per cent of them became carriers of virulent diphtheria bacilli. Noting the permanence of the reaction, Dr. Zingher reports that over 3,000 children above $1\frac{1}{2}$ years of age giving a negative reaction showed by re-tests that this persisted during the period of observation, which covered more than 3 years.

The Research Laboratory of the New York Department of Health, through its recommendations and publications, has taken a splendid initiative in demonstration and information regarding immunization. All the proper agencies for publicity of the Department of Health give suggestion and direction to this preventive effort. The program for inoculation of all susceptibles, which they urge, is prudent and practicable, and I presume to emphasize their plea for those from early infancy through the school-age period. Here immunization is expedient and urgent. About 10 per cent of deaths in all records occurs before the first year and over 20 per cent before 2 years. Inoculation generally done upon infants at 6 months would give a safeguarding protection. At this age few would fail to develop immunity. Dr. Zingher

suggests that all from infancy to 18 months be inoculated without reference to Schick test findings. Subjects at 18 months and over should receive the injection only if shown by the Schick test to be susceptible. Immunity to this disease conferred through public and private agencies must ultimately take its place with the present required vaccination for protection against small pox.

An inquiry made recently of 115 physicians in general practice, all of them averaging a considerable number of children patients, gained information that 110 had never performed the Schick test, 86 had never observed a Schick reaction, and that the total active immunizations in older children done by 2 members of this group totaled 5. In the wide campaign to which our responsibility commits us, community interest allows no distinction of subject, and I presume to doubt, if we physicians, in a definite, intensive way, in our private practice and in all our hospital opportunities, are sufficiently contributing to the establishment of an immune population. Looking to this beneficent result let us briefly survey the field in Greater New York for our preventive measures. We have 141,564 babies under 1 year, 610,870 children under 5 years, 527,175 children between 5 and 9 years—a highly susceptible age group, totaling 1,279,609.

Their medical supervision is roughly expressed as follows:

- 30,000 in 157 public charitable homes and asylums, and other child-caring institutions.
- 255,000 are treated in the regular hospitals having indoor children's service.
- 350,000 are more than casually met in outpatient practice.
- 500,000 are some or all time private patients.
- 3,238 homes are under inspection as boarding out housings for infants.
- 103 day nurseries present an average daily attendance of 7,352 children between the ages of 1 and 6 years.

There are 24,420 babies enrolled in the 60 Health Department Milk Stations and 24 other dairy, food and diet kitchens in our city, the census of whose aggregate weekly attendance is 110,526.

In several child-holding institutions, where, under Dr. Park's and Dr. Zingher's direction—immunity and immunization—the Schick toxin-antitoxin regimen have extensively been determined, diphtheria has practically been eradicated. To secure an identical

immunity for the large remaining group of susceptibles, those under our care, whether in our private or charitable administration, is obviously our community problem. How have we met this opportunity and responsibility? Excepting the work of Dr. Park and his associates in the institutions referred to, a careful survey of our 107 hospitals, 112 dispensaries, 157 asylums, 3,238 supervised infant boarding homes, 84 milk stations and 103 day nurseries, fails to find, save for the institutions directly under Dr. Park and his associates, any aggressive fixed program for needed active immunization.

In all these institutions, where we have a suggestive, if not an operative control, and in all private homes, a wide effort to determine susceptibility should be made and definite immunization undertaken where needed. In private practice, the time for the procedure has of course varying aspects of expediency, but the matter is none the less urgent, none the less indispensable. The records of our Health Department show that during 1 week in September this year (1919) over 275 cases of diphtheria were under treatment in private homes. Lately in the Wilkes Dispensary of St. Mary's Free Hospital for Children, active immunizations against diphtheria have been done in infants and children. Parental interest and coöperation have resulted from specific propaganda for prevention, as expressed in weekly clinic talks, posters and information cards.

Since April, 1918, I have regularly been suggesting this in my own practice as a preventive measure. The response is briefly summarized:

April 14, 1918-August 20, 1919.

Total 249 cases were innoculated.

30 infants under 6 months	} 2 at 3 months. } 6 at 4 months } 22 at 4 to 6 months.
48 infants 6 to 9 months	} 22 at 6½ to 7 months. } 26 at 7 to 9 months.
42 infants 9 to 13 months	} 10 at 9 months. } 21 at 10-11 months. } 11 at 11-13 months.

30 infants 13 to 20 months	} 12 at 14-15 months. } 14 at 16-18 months. } 4 at 18-20 months.
47 children 2 to 5 years	} 16 at 23 months to 3 years. } 31 at 3½ to 4½ years.
40 children 5 to 7 years	} 10 at 5 years. } 23 at 6 years. } 7 at 7 years.
12 children 8 to 9 years	} 7 at 8 years. } 5 at 9 years.

Babies of less than 20 pounds weight, or 1 year of age, were given ½ c.c.; all over this weight or age, 1 c.c. All except 5 subjects received 3 injections at intervals of one week. (At the time of the third injection in these 5 cases, 2 were severely ill—1 pneumonia and 1 acute double otitis—the other 3 temporarily removed from the city.)

Reactions.—Mild indisposition with temperature 101° to 103½° F. occurred in 5 of the 78 babies under 9 months, in 6 of the 77 between 9 and 24 months and in 8 of the 94 between 2 and 9 years. Reactions were mostly marked after the first dose. In 2 cases, brothers, ages 9 months and 5 years, a marked erythematous rash appeared after 15 hours, covering the neck, trunk, both having temperature 102°-103° F. for 2 days. In this case the older boy had given a marked pseudo and positive Schick reaction. Four other children, ages 3 to 5, cousins (parentage, sisters marrying brothers), all giving a positive Schick reaction, had temperatures 103°-104° F. for 2 days, with rather widely distributed exanthematous rashes after the first injections. No marked later reactions.

Of the 149 babies immunized under 20 months, 18 were Schicked before inoculation. There were positive: 1 at 4 months, 2 at 6 months, 1 at 8 months, 4 at 9 months, 5 at 12-13 months, 5 at 15 months. All the remaining 99, being those over 20 months, were shown by the Schick test previous to inoculation to be susceptible. One hundred and sixty-four of those inoculated were done last year and it has been possible to Schick test 146 of these at a date not less than 8 months after inoculation. Of the 20 babies done

under 6 months, 18 were tested and were negative. (This includes the 2 done at 3 months and also 3 of the 5 cases who received only 2 inoculations.) Of the 32 under 9 months, 29 cases were negative, 1 slightly positive, 2 not tested. (The slightly positive subject was a child 7 months old when inoculated and 1 of the 5 received only 2 doses.) Of the 33 from 9 to 13 months, 29 were negative, 4 not tested. Of the 18 from 15 to 20 months, 16 gave negative Schick tests, 2 not tested. Of the 28 from 2 to 5 years, 25 were negative, 1 slightly positive, 2 not tested. Of the 25 from 4 to 7 years, 19 were negative, 6 not tested. Of the 8 from 8 to 9 years, all were negative.

Of the 146 tested to determine conferred immunity, 2 only gave a slightly positive Schick. One of these, an infant, had but 2 inoculations. The 8 infants under 1 year, who were proved susceptible before inoculation, all became negative after injection. Of 30 children, 2 to 9 years, injected in the period January to April, 1919, then positive to Schick test, 1 only remained slightly positive in September, 1919.

Injections were begun only when children were well and had had normal temperatures for the preceding day. Eight second and twelve third inoculations were made upon children slightly to considerably ill—two (2) with acute otitis requiring paracentesis, four (4) with bronchitis, temperatures 100° to 101° F., four (4) infants with mild afebrile gastrointestinal disturbances. Not one of these children appeared worse for the added inoculation.

Four babies, less than 2 years old, had definite prolonged exposure to diphtheria 4 to 6 months after active immunization. A few Klebs-Loeffler bacilli were found in the nose and throat cultures of three of the subjects. No diphtheria resulted.

Two children (5 to 7 years), 8 months after immunization, were continuously for a day and night with a third child who 24 hours later became ill with diphtheria and afterwards died. Neither protected child showed illness, although Klebs-Loeffler bacilli persisted in their nose and throat cultures for several days.

Practically all parents of infants under 18 months chose inoculation without a preliminary Schick test. All eagerly desired the later Schick to confirm the establishment of protection.

Immunization was advised to 87 families, accepted by 68 (of the 19 heads of families declining inoculation, 8 were physicians). Ten subjects were children of physicians, 10 were children of

those professing Christian Science belief, 42 were children of parents of the manual laboring class.

The remaining 217 children were of the average well-to-do parent.

Our community, as we meet it in private or hospital relation, convinced of the efficacy and safety of active immunization, will coöperate in the matter of diphtheria control. The splendid pioneer work of Drs. Park and Zingher needs no comment. The initiative and popularity of a wide community program for immunization now rests with the pediatricist and general practitioner.

These foregoing brief records are offered as purely clinical experiences, which present the possibility of such preventive effort among the children of the average conservatively informed parent.

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SEROTHERAPY OF PURULENT PLEURISY IN INFANTS (Archives de Médecine des Enfants, Paris, Oct., 1919). The three cases reported by P. Nobécourt and J. Paraf, in infants 2, 4 and 5 months old, testify to the excellent results from antipneumococcus serum in bronchopneumonia complicated with purulent pleurisy. The pneumococcus of type II was cultivated from the pleural effusion and from the nose and throat secretions. The treatment included also hot baths, cool moist packs of the thorax, injections of camphorated oil and inhalation of medicated oxygen. The antiserum was injected into the pleura after evacuation of the purulent fluid, and into the lung, in doses of 5 or 10 c.c. and 3 c.c. respectively. One of the children was injected with it also by the vein. The injections were kept up for three to five days, and a total of 30 c.c. in two and of 60 c.c. in the third case was thus used. Unmistakable improvement followed the serotherapy, and the infants all recovered from their pneumococcus infection.—*Journal A, M, A.*

THE MEASURE AND DEVELOPMENT OF NUTRITION IN CHILDHOOD.*

By GEORGE M. RETAN, M.D.,

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During the past year the state of nutrition of our American children has occupied a prominent place in the thought of the medical profession. This is shown by the large amount of work done towards the correction of malnutrition both in the school-room and in clinics and by the increasing literature dealing with this subject.

The results of this work demonstrate a new responsibility of the physician, which is a more careful consideration of the nutrition of children. This would tend to correct a large percentage of malnutrition now existing. These cases of malnutrition should be corrected, for malnutrition in children reduces their resisting power to infection and retards their normal development.

The measure of nutrition is the best single indicator of a child's state of health. There is no other single observation that could be made on a group of children that would lend so much knowledge of their health as a series of weights over a period of time. This is especially true if these weights were compared with a normal standard.

The first step in considering a nutritional problem is to adopt a correct standard of measurement. This step is of vital importance. The first part of our paper deals with the study of this subject.

There are five possible factors that could be used as a basis of measurement. These are weight, height, age, sex and nationality. There are three relationships that should be considered. The relation of age to weight, the relation of age to height and the relation of height to weight. The bearing of sex and nationality on our problem will also be considered.

Until of recent date the standard used was the relation of age to weight. In a child, age is a measure of the time of growth. It does not necessarily constitute a measure of the rate of growth. Chart No. 1 gives a graphic representation of the relation of weight to age as a measure of nutrition. Weight is shown along

* Read at the annual meeting of the Medical Society of the State of New York, at Syracuse, May 7, 1919.

the ordinate, each small square representing one pound. Age is shown along the abscissa, each large square representing one year. Normally nourished children are represented by dots, badly nourished children are represented by crosses.

There are two striking truths brought out by the study of this chart. First, that there is a great variation in weight for any given age. Second, that the relation of age to weight does not separate the normally nourished children from the undernourished children. This is shown in the chart by the fact that many crosses

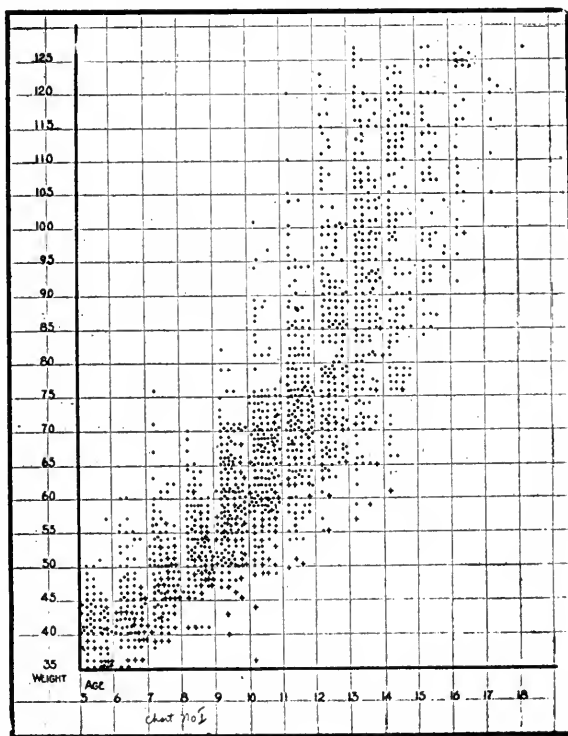


CHART No. 1.

are seen among the dots. This would prove that the standard based on the relation of age to weight as a measure of nutrition is not correct.

The relation of age to height cannot be used as a standard of the measure of nutrition. Height is a measure of the development of stature and as age measures the time of growth, their relation-

ship would measure the rate of development in stature. It has naught to do with nutrition.

The relation of height to weight is the correct standard. It is plain that a child of a given weight would present a grade of nutrition in exact proportion to his height.

Most scales of nutrition have been based on average weights. Inasmuch as 20 per cent of all children have been found to be undernourished and but 2 per cent have been found to be overnourished, the average of all children would not be the average of normally nourished children. Furthermore, this method will

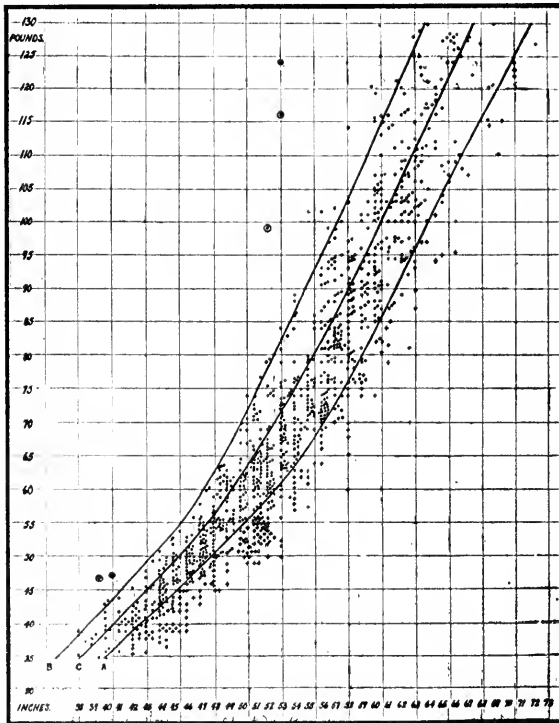


CHART No. 2.

give a concrete number as the normal weight of a given child, but there can be no concrete number for the normal weight, since normal weight is a variable and should be represented by a zone.

Chart No. 2 was made during a physical examination of school children ranging between the ages of 5 and 16 years. They were

weighed and measured with their shoes on, but with the clothing removed from their chests. They were divided into three classes of nutrition and were placed on the chart in the following manner: badly nourished cases were represented by crosses, normally nourished cases by dots, while overnourished cases were represented by circles. Line A was then drawn along the upper border of the malnutrition cases and line B was drawn along the upper border of normally nourished cases. The zone between lines A and B is the zone of normal nutrition and the zone below line A is the zone of malnutrition. Line C was then drawn midway be-

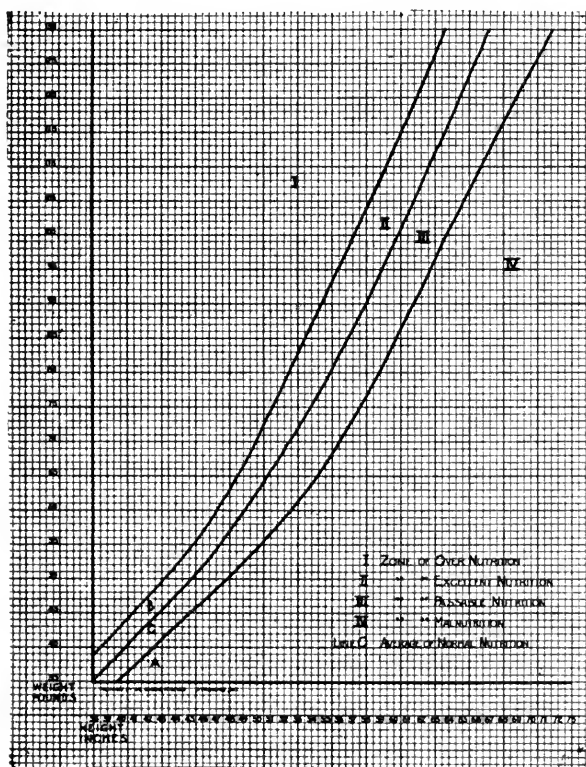


CHART No. 3.

tween lines A and B. Line C represents the average weight of normally nourished children. All children are thus arbitrarily placed in four zones of nutrition. The zone of overnourished children is above line B. The zone of excellently nourished chil-

dren is above line C, since children in this zone are above the normal average. The zone of passably nourished children is below line C, since children in this zone are below the normal average. The zone of badly nourished children is below line A. In this chart there is seen no such diffuse occurrence of crosses among the dots as in Chart No. 1. On the contrary, the crosses appear in a definite group along the lower border of the dots.

Chart No. 3 gives the zones as formed in Chart No. 2. This chart can be used to measure nutrition. In measuring the nutrition of a given child one can place his weight and height on this chart and obtain a mental picture of his nutritional relationship.

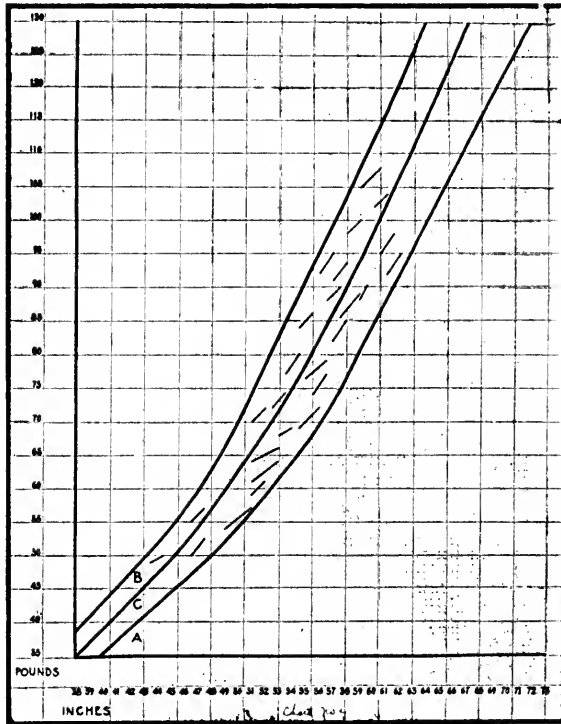


CHART No. 4.

For example, let us take a child of 53 inches in height. If he weighs 55 pounds he would fall on a point 6 pounds below the line of malnutrition and 17 pounds below the average weight of normal children. This makes his degree of malnutrition apparent. If

remove shoes. The loss in height from the removal of the shoes compensates for the loss in weight from the shoes. Chart No. 4 shows a series of children weighed and measured both with and without shoes, the two observations on each child being connected by a line. The lower end of the line represents the weight and height without shoes. The upper end of the line represents the weight and height of the same child with shoes. You may observe that these lines are sufficiently parallel to the average normal weight line to make very little difference in the measure of the nutritional state of the child.

The factors of sex and nationality must be considered. Chart No. 5 gives a comparison of the nutrition of girls and boys. This chart was made from the scale of Boas and Burke. The boys are represented by a black line. The girls are represented by a broken line. You will observe that these lines run nearly together and cross in places, showing no constant variation. This would tend to prove that a separate scale of measurement is not necessary for each sex. Furthermore, it is to be borne in mind that the nutritional standard is represented by zones based on the relation of weight to height and not by fixed lines based upon averages.

It is obvious that nationality plays no rôle in the measure of nutrition when the nutritional standard is represented by zones based on the relation of weight to height.

Malnutrition should be considered in the same light as actual disease. Its cause should be determined and remedied.

The principal causes of malnutrition may be classified as:

A. Physical defects. 1. Adenoids. 2. Hypertrophied tonsils. 3. Decayed teeth. 4. Eye strain.

B. Habits. 1. Food habits. (a) Coffee, tea and alcohol; (b) Insufficient food; (c) Candy between meals. 2. Lack of sufficient rest.

C. Hygiene. 1. Sleeping in congested, unventilated rooms.

D. Disease. 1. Any actual diseased condition as tuberculosis, syphilis, etc.

These causes of malnutrition suggest the proper procedure to follow in their correction. Each malnourished child should receive a careful physical examination, then any physical defect found which has a bearing on the case should be remedied.

The majority of all malnutrition cases are either caused by

infected tonsils and adenoids or by faulty diet and often a combination of the two.

The result of tonsillectomy on nutrition is shown by the following data. This gives a summary of the weights of 95 children who have had their tonsils removed for at least one year. These children have lived under the same conditions following tonsillectomy and have received the same diet. Six pounds was used as an average yearly gain for basis of comparison. Sixty-eight cases or 71.5 per cent gained more than 6 pounds. Separating the cases into different rates of gain gives the following table:

Above 20 pounds, 4, or 4.2 per cent; between 20 and 15 pounds, 10, or 10.5 per cent; between 15 and 10 pounds, 22, or 23.1 per cent; between 10 and 6 pounds, 32, or 33.6 per cent; less than 6 pounds, 27, or 28.5 per cent.

Three cases failed to gain during the year and two cases lost in weight. One of the two cases that lost was an active case of pulmonary tuberculosis.

We have made an investigation to determine the diet of 530 school children between the ages of 5 and 12 years. The diets were separated into 3 classes. First class: normally balanced diet of sufficient food value, 58 or 10.9 per cent. Second class: sufficient in food value, but not balanced, 245 or 46.3 per cent. Third class: insufficient in food value, 227 or 42.7 per cent. Three hundred and fifteen or 54 per cent were in the habit of drinking coffee with their meals.

These data show that nearly half of our children receive insufficient food and that over half of our children are in the habit of drinking coffee. This demonstrates the importance of considering diet in relation to any nutritional problem.

It is beyond the scope of this paper to discuss the different methods of correcting malnutrition. Excellent methods have been elaborated for school and dispensary practice. These have been reported in detail in medical literature. Our references to them are appended to this paper.

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RECENT DEVELOPMENTS IN OUTPATIENT WORK*

By CHARLES HENDEE SMITH, M.D.,

New York.

In nearly every hospital the service is divided into two distinct parts, the wards and the outpatient department. In the past, the wards have been attended by the older and better men, who have, in general, won their position by their ability and experience. The outpatient physicians have been the younger, more recent graduates, who have had little experience, and who work practically without direction. The connection between the two services is merely nominal in most institutions. The accident of being within the same grounds or under the same roof often seems to be the only bond. The visiting physicians to the wards rarely have it as part of their regular duties to direct the management or act as constituents in the outpatient department. The chiefs of clinic are in a few hospitals also assistant attendings on the wards, but this has been the case for only a few years. Vacancies in the ward and visiting staffs are sometimes filled from the outpatient department, but quite as often by appointment of men from "outside."

There are two main reasons that induce a physician to work in an outpatient department, namely, the hope of promotion to the ward service and the opportunity to acquire knowledge or experience by handling patients. The young dispensary physician soon finds that the probability of advancement is very small. Under the plan on which most outpatient departments are conducted the possibility of learning is limited to what a man can teach himself and this is insufficient to hold many men for long. The result is undermanning by physicians and overcrowding by patients, which means hasty, careless work, unsatisfactory to both the patient and to the man who is forced to do it.

What are the actual differences between the two kinds of work? As far as a children's service is concerned, it may be stated briefly as follows: The patients in the wards are the acutely ill (pneumonia, pleurisy, meningitis, etc.), cardiacs (more or less decompensated), unusual or obscure cases for diagnosis, feeding cases (including acute digestive disturbances), and a large num-

*Read at the seventieth annual session of the A. M. A., Section on Diseases of Children, held at Atlantic City, N. J., June 11, 12 and 13, 1919.

ber of minor or chronic cases, many of which do not belong in a ward at all. The patients are away from their homes and parents, unhappy, homesick, and too often uncomfortable or even comparatively neglected. All these are artificial conditions for a child. An adult may adjust his mind and his habits to them with comparative ease, a child does so only with difficulty. The most that can be done for the child is to effect a cure of his acute illness. When he is discharged from the ward he goes back to his old environment, which may be responsible for his illness and which has not been influenced by the child's stay in the hospital.

In contrast, the child coming to the outpatient department comes with his mother to see a doctor, which is not an altogether abnormal circumstance. He lives at home under normal conditions for him. The home surroundings and manner of life are the most important things in every child's life. It is generally possible to influence these factors by education of the mother directly or by efficient social service work. Moreover, the patients who come for treatment have all the conditions that are of interest to the physician and to the hygienist. These include the acutely ill patients, the rare cases and all the others seen in the ward, for a great part of the ward cases come through the outpatient department. In addition there are the numerous conditions that never appear in the ward at all and yet really make up the larger part of pediatric practice. Feeding cases in particular can usually be handled much better at home, because the mother's love and care more than compensate for the superior scientific preparation of food in the ward. We all know that the best place for a baby is at home unless the mother is utterly hopeless.

Does not, then, the outpatient material offer more interest, more experience with the kind of patients seen in private practice, and greater hope of successful treatment than that seen in the wards?

There has been a change in the medical world during the last decade, and the outpatient department is slowly coming into its proper place. Dr. Richard Cabot was among the first to voice this when he said that he had been released from routine ward work and allowed to devote his time to outpatient work.

When the Children's Medical Division of Bellevue Hospital

was reorganized under Dr. La Féra's direction three years ago, these principles were recognized as being fundamental:

1. The two branches of the service shall be coördinate and of equal importance.
2. There shall be a close connection between the two.
3. The outpatient department shall be organized so as to be of the greatest possible interest to the men working in it.

The closest connection between the services is maintained by having the attending staff identified in both. This staff, as recently enlarged, is composed of a director, three attending physicians, four assistant attending physicians, six adjunct assistants, and an infinite number of outpatient assistants. The fourteen attendings all have definite duties both in the wards and also in the outpatient department during the entire year, except when on vacation. Either the director or the senior attending physician comes to the latter daily for consultation on interesting cases. One of the full attendings has direct charge of the work and is there part of every afternoon. The assistant and adjunct attendings work in the outpatient department and in the wards three and four days a week each. The clinic assistants who have no ward appointments are urged to visit the wards frequently, and make rounds several times a week with the visiting staff. In addition two of the six interns are on duty in the outpatient department daily, serving for six weeks each, in rotation, which gives another useful bond between the two services. All this insures an adequate staff for the outpatient department. The close association between the two is extremely valuable for it enables us to send patients back and forth from the outpatient department to the wards and to have them under the observation of the same man in both places.

In order to lighten the burden of the ward work so that the attendings may have the time necessary for the outpatient work, two or more men are on duty at once on each ward. Each man is obliged to make complete rounds only three or four days a week. On the other days he may go in and see the patients of greatest interest, and spend as much or as little time as he is able. This plan gives the ward patients the added advantage of double observation. The two men on each ward usually make rounds together once or twice a week, which eliminates the pos-

sible disadvantage of having two men caring for the same patients. In practice this works out very well.

The organization of the actual work differs in few respects from that in any other dispensary, except that every effort has been made to save waste motion and time otherwise lost, for the attendance is large (75 to 125 daily) and system is needed to handle so many children. At the door of the waiting room the head nurse examines each child and questions the mother as to her reason for coming. All with rashes, sore throats and suspicious coughs are shunted directly into an isolation room and examined at once by a physician. The seats in the waiting room are also arranged so that the children of different ages do not mingle with each other while waiting. This enables a mother to bring a small infant with very little risk of contact with the older children who are so much more apt to have infectious diseases. By these simple precautions most of the infectious diseases are weeded out and the risk of cross infection is reduced to a minimum. We have very few cases of this and practically none among the infants. The tables on which children are examined are all separated by screens or by a distance of several feet, so that the contacts are reduced here also. There are about thirty such tables, and including the children whose histories are being taken at small desks in the various rooms from forty-five to fifty children may be scattered through the different rooms at one time. This relieves the congestion in the waiting room and also reduces contacts. (Definite whooping cough cases are kept in an outer hallway, medicines prescribed and directions given. The mother is told to return each week but not to bring the child unless he becomes very sick.)

If there is no suspicion of infectious diseases the children are taken in turn into the different rooms, the history is taken or return note is made by volunteer or social worker. The weight, height and temperature are taken, and the child is prepared for examination on a table behind a screen. The doctor then makes his examination, records it, and prescribes his treatment, which he may explain to the mother in full, or he may turn her over to a volunteer or social worker, who does this just as well in the routine case. In this way the physician can handle a large number of children with minor troubles in a short time, and has plenty of time for the interesting patients.

Time is also saved by the extensive use of printed matter, and by the use of rubber stamps whenever possible. Each physician's desk has a small box which contains a number of slips stamped with the prescriptions in common use, so that it is rarely necessary to write out an order for medicine.

In order to facilitate the handling of the patients and the study of cases of interest, on admission the children are divided according to *age* into three groups: infants (up to 15 months), runabouts (15 months to 4 years) and older children (4 to 12 years). (We are fortunate enough to have eight good-sized rooms, besides the waiting room, so that each group or class may have a room to itself.)

In addition to the age grouping, classes have been formed according to *disease* whenever feasible. The largest of these have been the cardiac class, the nutrition class, the vaginitis class and the syphilis class. The infants' room is of course principally an infant feeding class. In the runabout room are treated not only the acute conditions for which the children first come, but chronic cases like rickets, chronic indigestion and anemia. In addition, well children are followed up and urged to come back for weighing and advice after the original acute conditions have cleared up. Many children graduate into this room from the infants' room and continue to come for observation only. Although not under our direction, the class for children of tuberculous families is held in one of our rooms and is in charge of one of our assistant attendings.

Other small classes that have been in existence for a longer or shorter time have grouped cases of eczema, recurrent bronchitis, enuresis. Vaccinations are done in a separate room at the clinic on two days a week, and this amounts to a class, as it requires organization on a definite plan to efficiently handle the considerable number who come for vaccination, return dressings and certificates.

The advantages of grouping children who have the same disease or conditions are numerous and obvious.

First among these is the possibility of saving the effort of the physicians, because nearly all of the children in a class can be handled on a common plan of study and treatment. One set of social workers, nurses and volunteer assistants can be trained to

go through a regular routine so that there is tremendous saving of time. In many classes, talks can be given with advantage to the entire group of mothers and children. The children become imbued with a "class spirit" and the element of competition is a most valuable aid toward making the children try to help the physicians get results.

Just as soon as a number of cases of one kind are grouped together it is impossible to avoid making comparisons. The similarities and differences in the various histories, physical signs and in the course and progress of the disease, begin to stand out, in fact, scientific study becomes possible. One cannot watch 400 cardiac cases for three years without learning something. Yet these 400 cases might have drifted through an ordinary clinic during the same time under the observation of many men, with no systematic plan of study of treatment, and no one would have been the wiser. The existence of a special class is soon widely known, and many cases are referred to it by school nurses and the other agencies at work in the city.

The class system also enables the physician to concentrate on a single subject each day. Each man attends three to six days a week. On one day he is on duty in the room for older children. Here he sees new cases mostly, with such return cases as have not been referred to a special class. Each man is in the infant room one day, so that all have some feeding cases. Another day every man works in a special class, and on that day he is not required to see any patient outside it. It is quite simple to have patients return on the proper day, so that they can be easily followed by the man interested. If they return on the wrong day they are seen by another doctor, but told to come back next time on the proper day. This rotation of service and concentration on a single subject has proved itself to be one of the strongest means of holding the men. If the individual case ceases to be of interest, the study of groups opens up a whole new field.¹

The work in the various classes cannot be described in detail here. Some of it has already been published, and other reports are in preparation. The cardiac class is fortunate in

1. A small bulletin board shows the various rooms and the men who are working in each one. The names are printed on small strips by means of gummed letters and are fastened with thumb tacks so that it is possible to rearrange them quickly.

being endowed by a fund established in memory of Dr. John Huddleston, which insures its continued existence. There are over four hundred children enrolled, and under more or less close observation. The principal effort made thus far has been to try to help the hearts by improving the general condition of the children. This has been done by treating remediable defects (teeth, tonsils, etc.), and by training the child in good habits of eating and living. A gain in weight has been made the main object and almost always is accompanied by improvement in the conditions of the heart. The children are kept under observation until they go to work.

In the nutrition class an effort has been made to determine whether undernourished children of school age can be made to gain weight when treated in large numbers by the class system. More than 300 have passed through the class and 100 attend regularly in groups. The results are not so perfect as in small classes, but about 60 per cent of the children can be made to gain very well. This type of large class is necessary if any impression is to be made on the enormous problem of undernutrition.

The vaginitis class has treated 125 cases in the past year. Although the results are not always brilliantly successful, yet these unfortunate little girls must be watched and treated. The mother must be educated to take the precautions necessary to prevent the spread of the infection, and also must be encouraged by the thought that something is being done for the children. The fact that 50 per cent of the vaginitis is contracted in various hospital wards makes it all the more incumbent for every hospital to maintain a systematic means of treating the victims of this disease.

The syphilis class has 97 positive cases on file, and has taken 156 Wassermann tests during the past year. In few diseases is it so important to have an automatic mechanism for treatment and for follow-up of the delinquent cases. The taking of Wassermann tests and treatment by injection has been simplified so that this class now runs very well. One social worker spends her entire time on the follow-up of the vaginitis and syphilitic cases. One or two nurses and one volunteer assist in the conduct of the classes.

The infants' room is perhaps the most efficient of the classes. Under the direction of one of the volunteers, who is assisted by

several others, this room is conducted so smoothly that it is a pleasure to work in it. About 1,000 infants are under observation during the year, and the attendance averages about 150 a week. The follow-up system is kept very well and, by postal or by a house visit, patients are urged to return if they do not attend regularly. One social worker spends all her time on the infants, largely on the bottle fed babies.

The matter of record forms is of great importance in simplifying a clinic's organization. We believe firmly in the printed form for histories and physical examinations. By means of these the history can be taken rapidly and easily by the physician, or by any intelligent person, after a very small amount of training. Actually most of our histories are taken by our volunteer workers—a few by social workers or nurses. The form insures a complete history on every child, always insures its being taken in the same order, with each fact always in the same place, so that it may be rapidly found at any time. The contrast to the incomplete, rambling, and often illegible histories taken on the blank page in general use in hospitals is more than striking. The saving in time is about 50 per cent. It would take from five to seven minutes for every case merely to write out the headings on our history form.

The physical examinations are also recorded under printed headings. The physician can write down the greater part of the examination in a few seconds by the use of symbols (N for normal, O for absent, + for enlarged, etc.). Here again the printed form gets better and more complete results than the blank page.²

Two objections to the printed forms are advanced by those who have not used them. One is that there is not always enough room for unusually long notes, under any one heading. It is, however, very simple to write "see next page" and to continue to any desired extent. The second objection is that form histories are inelastic and tend to become set and meaningless. The answer to this is that they need not be and actually are not in practice. It has interested me to observe the opponents of the form history system in three different institutions during the last eight years. After a few months, without exception, they have been convinced

2. The same advantages apply to form hospital histories. Since the introduction of those forms into our ward service the improvement in the histories and physical examination has been noteworthy.

that for routine work of this kind the form is the best solution. The form gets complete records of all cases; the blank page rarely does of any case.

In the infants' room the notes on return visits are also made on a form arranged in vertical columns so that the date, weight, temperature, food taken, vomiting, stools, remarks and treatment appear always in the same column and are easily compared and followed. The doctor may add any other facts he desires and write in the proper columns his observations, directions for feeding and prescriptions. The result is a complete return note at each visit. Our records of feeding cases compare very favorably with carefully kept records of private patients. A chart that shows the weight curve and the calories taken, graphically plotted, adds to the completeness of the record. Weight charts are also used in several of the other classes and are useful in interesting the children in their own gains.

The treatment of the patients is greatly expedited by having a large number of printed sheets giving directions for diet and all sorts of instructions for the care of the child. This is the usual clinic literature but is elaborated to the fullest degree. On each doctor's desk is a pile of sheets of various kinds. These include "Rules for the Care of the Child," "Directions for the Care of a Sick Child," "Suggestions for Nursing Mothers," "How to Prepare Bottles," "Barley Water," "Home Record Sheets," "Bed Wetting Directions," "Diet List for Second Year," and also diet lists for children from 2 to 6 years and from 6 to 12 years.

This literature must be given out with care to impress on the mother the fact that it has been written for her child especially, and must be explained, additions made or portions scratched if necessary in a way that will make her feel that it means something, otherwise it will be thrown away at the door. Properly used printed matter is indispensable. Even if it fails to accomplish its purpose in every instance, it helps a great many at least. It is impossible to write out full directions for all and futile to take the time to do it. I have made an especial effort for several years to inquire as to the diet and habits of children whose mothers have been given this kind of printed directions in the proper manner. In a very large majority of cases directions are used and followed with care. Even the most ignorant mother really wants to learn

how to best care for her child. If she is not properly directed it is the fault of the physician or of the method used.

Two years ago two young women with very little training or experience came to the outpatient department to act as volunteer assistants. They started in by taking temperatures, weighing babies and assisting in minor ways, but became more and more useful and in a short time one of them was placed in charge of the conduct of the infants' room. About this time this country entered the war and it was evident that there was to be a great shortage of doctors. An appeal was sent out and immediately a large number of women responded. A system was devised by which they could be used in various ways to save the time of physicians. Some of them have worked from two to six days a week for the last two years and their devotion and faithfulness have made it possible to carry on the work, which must otherwise have fallen into utter disorganization. At times during the influenza epidemic the medical staff was reduced to one or two men, but with the aid of 15 or 20 volunteer women the work was covered, and no child was turned away without a full history being taken and a complete examination and adequate directions for treatment being given.

The volunteer work has been described in some detail elsewhere.³ Briefly, their main help is in the taking of histories, making return notes, taking weights, heights and temperatures, assisting the doctors in giving and explaining directions to the mothers as to diet and care of the sick children, keeping follow-up systems, sending postals, and in many ways acting as a link between the doctor and the social service system. Some of them can do simple laboratory tests, von Pirquet tests, etc. Each of the rooms is in charge of a volunteer, who keeps the work moving, sees that the children are brought in, assigns them to the others who take histories, and, in general, acts as clinic manager for that room. Besides the definite duties assigned, each volunteer does dozens of small things each day, every one of which expedites the work and saves the time of the doctors.

The volunteers have not stopped this work since the war ended, nor does their interest seem to lag. Many of these women have found that this is a direct way of doing practical work that

3. *Modern Hospital*, May, 1918.

helps the poor of the city. I feel very strongly that this volunteer work in clinics is the greatest new thing that has come out of the war into civilian medical work. It can be made so attractive to volunteers of the right type that their interest can be held even in peace times. The kind of work they can do does not need long training, but does require personality and enthusiasm which cannot always be obtained by paying salaries.

In most institutions doctors have been taking histories in laborious long hand and doing all the comparatively unskilled work mentioned above after years of study and experience. It is hard to imagine a more inefficient use of the time of highly trained men. Hospitals cannot always pay for clerks or secretaries, but if this volunteer work can be continued the outpatient department need never slide back into the old methods. The waste of time of the physicians eventually means a lack of time for essentials and slipshod, inaccurate work. If the physician is relieved of the work which the volunteer does, he is enabled to spend his time in careful examinations, laboratory tests, actual study of the patients and in giving full directions for treatment.

The modern outpatient department depends for results on social service quite as much as on medical care. We are blessed at Bellevue by having a most efficient Social Service Department. One worker has charge of the older children in the general clinic. One spends her entire time on the infants, especially for bottle fed. The cardiac and nutrition classes each have a full-time worker. The vaginitis and syphilis classes have another. There is also a worker for the ward patients. The follow-up work of this staff is of the highest type. Full social service reports are entered on the medical histories where they are easily available, and are of the greatest assistance to the physicians. Each worker attends the outpatient department only two or three times a week, but keeps in close touch through the volunteers. Every child discharged from the ward has a follow-up card made out and an effort is made to get back all the cases of interest.

The educational function of a large children's service is many-sided. No small obligation is placed on the men who have the privilege of conducting such a service to see that the educational possibilities are not wasted.

The education of the interns comes first, and the value of the

outpatient department in teaching them cannot be too strongly emphasized. The intern who graduates from the average hospital has generally had excellent training in the diagnosis and treatment of acute disease, but practically nothing else. He has had no experience in handling the type of case which will comprise about 90 per cent of his private practice. This experience our interns get by working in our outpatient department. Each one serves six afternoons a week for about half the time he is on the service. It has been interesting to note the change in attitude toward this work since this plan was initiated. Each new set of interns resented the innovation somewhat and felt that it was rather an imposition to force them to do outpatient work. It was necessary to remind some of them that this work was not optional but part of their regular duties. It did not take long for the value of the work to sink in, however, and they realize now that this outpatient work is one of the most valuable features of their internship.

Teaching of students should also be done in the outpatient department as well as in the wards. It is, of course, instructive to see a case of pneumonia or meningitis, but how much more important that the newly graduated physician should know how to treat an acute cold or tonsillitis, an acute digestive upset in an infant, know how to handle a normal breast or bottle-fed baby, how to recognize and treat undernutrition in older children, and most of all, how to deal with a mother, instead of merely giving orders to a nurse. On our service the undergraduate students spend alternate teaching days in the wards and the outpatient department, and just as much stress is laid on one type of teaching as on the other.

The teaching possibilities of a hospital should not be confined to undergraduate students and interns. A large number of practicing physicians come to us asking for graduate instruction. Although we have had no regular course as yet, we have encouraged these men to come and work with us for as long a time as they have found it profitable. They have been given free access to the wards and the laboratory during the mornings. They spend the afternoons in the outpatient department and make ward rounds with the attending physicians. There is an increasing demand for this kind of opportunity, and it is the duty of the hospitals to meet the demand. We do not encourage men to come for only a few weeks, but think they can spend from two to six months

in this way with great profit. We believe that this ought to yield better results than merely listening to a short course of lectures, for, if properly directed, it is the work a man really does himself that teaches him. We are planning to extend and systematize this course in the future to meet the perfectly just demand of the better men of the country for a share in the opportunities that we enjoy.

The education of the volunteers and the nurses is no small matter. The medical information that they acquire cannot fail to be of value to any person.

The last and most important educational function is the education of the mothers and children. If a mother brings a child to a hospital with a cold or sore throat and is allowed to go away with merely a little medicine, that institution is not doing its full duty. She ought to receive careful instruction as to the nursing and feeding of the child during his acute illness (which is even more important than the medicine). In addition no mother should be allowed to go away without being questioned as to the diet, habits and mode of life of the child. She should have a list showing what the diet should be after the acute illness is over, and advice as to regular hours of eating, sleep, fresh air, exercise, bathing and so forth. Much of this may be on the printed leaflet, but the personal word must be added to drive it home. Food exhibits, wall charts, class talks, all are useful educational aids. The real test of an outpatient department organization is its attitude toward the child applying for treatment. If he is merely a "case," he will receive little besides treatment for the chief complaint for which he comes. If he is a "patient," then he is considered as a sick child who needs a study of his whole life, diet and habits, as well as care of his temporary ailment. The question should not be: How can we cure his acute ailment with the least effort? but, How much can we do for this child and mother?

Through education in health habits lies the hope of bringing up in the world a better race than we have today. This health education should be done in the schools; but advice given by physicians in a hospital often carries more weight than school instruction. Every outpatient department should have a system that insures more or less automatically that this educational work is done.

66 West Fifty-fifth Street.

SOCIETY REPORT

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS.

Stated Meeting, Held December 11, 1919.

DR. MURRAY H. BASS, *in the Chair.*

SOME REMARKS ON CRANIAL THROMBOSIS IN CHILDREN.

DR. SEYMOUR OPPENHEIMER presented this paper. (To be published in a later number of ARCHIVES.)

Discussion—DR. HERMAN SCHWARZ said that he could not allow this paper to pass without expressing his appreciation of the clear picture of marasmic sinus thrombosis that Dr. Oppenheimer had given us. He would like to ask Dr. Oppenheimer his experience with otitic thrombosis in infants. In Dr. Schwarz's experience, with the exception of the one case that he had seen with Dr. Oppenheimer, he had never seen another case. This is important in diagnosing fluctuating ear temperatures in infants.

DR. OPPENHEIMER, in reply to Dr. Schwarz's inquiries, said the youngest case of sinus thrombosis that had come under his observation was the one to which Dr. Schwarz had referred and which he saw in consultation. Unfortunately that case had many complications; in addition to the sinus thrombosis the child had a meningitis, diphtheria, and a brain abscess. The child died.

Last year he had seen 3 children with sinus thrombosis under the age of 2 years, but up to that time he had never seen a case of sinus thrombosis in a child under 5 years of age. He had had the opportunity of studying about 150 cases of his own and possibly he had seen 50 others in consultation with other men. Of these, there were about 12 cases in children under 10 years of age.

As to the relative frequency of sinus thrombosis as a complication of mastoid disease, he believed that about 4 per cent of all cases of mastoid disease developed some type of intracranial complication, and probably 60 per cent of these complications were in the nature of a sinus thrombosis.

SOME EXPERIENCE WITH MALARIA AMONG CHILDREN IN PALESTINE.

DR. SOPHIE RABINOFF presented this paper by invitation. (To be published in a later number of ARCHIVES.)

Discussion—DR. GAYLORD W. GRAVES said that he would like to ask a question with reference to the effect of quinine given at different stages of the attack. It had been said that it took several hours for quinine to saturate the blood plasma and it was customary for physicians to treat malaria by giving quinine every few hours. Dr. Tuttle at the Presbyterian Hospital had suggested that in the case of a patient who had passed through a chill one should wait until the next chill and at its height give 10 grains of quinine. They did this in a case and the patient had no subsequent chill. The quinine was repeated, but at such an interval that it was evident that the initial 10 grain dose did the work.

On one occasion a man came into the hospital with a temperature of 105° F. and his condition was diagnosed as typhoid fever. Next morning his temperature was 98° F., and as there were no signs of perforation, a blood smear was examined and the malarial parasite found. The man was then given quinine with tincture of capsicum which was supposed to hasten the absorption of the quinine. Two days later he had a very slight chill (temperature not over 103° F.). It was evident that the large dose of quinine, although given late, had mitigated the severity of the chill one-half. The day following admission, he had another chill, making it seem likely that there were 2 broods of parasites. Quinine given at the height of this chill controlled the infection so that there was no chill 2 days thereafter. After several months the patient was seen outside the hospital for an illness diagnosed as influenza. Several days later the spleen was found enlarged and the temperature found to be 104° F. At this point quinine was given and no further chill occurred, although blood examination revealed the malarial parasite.

Dr. Tuttle although giving no positive explanation had suggested the theory that continuous administration of quinine discouraged the emigration of parasites from the corpuscles, while if one waited until they were really out and then hit them "on the head," as the speaker interpreted the theory, the effect was more pronounced.

He would like to know if the psychological moment to administer quinine was at the *height* of the chill or before, as was customary.

DR. HUGH CHAPLIN said that in chronic cases of malaria they

had noticed a slight, rather constant rise in the evening temperature to 100° or 100.5° F., rarely over that. They had one child with an attack of malaria in the Orient, treated for about a month with quinine, and after that for a number of months the child had a slight rise in temperature in the evening. There were other possible explanations for this rise in temperature as possibly a slight indigestion or a tuberculous family history, but neither were sufficient to account for this rise in temperature in this case. They did not find the organisms until later when the child had a chill and then the organisms were found to be present. Was the chill in this case due to organisms that had been lying dormant during this period?

DR. H. L. DOWD said in the treatment of malaria the administration of bicarbonate of soda and lemon juice, which because of its acetic acid acted on the blood cells favoring absorption of the bicarbonate of soda, had been an aid. They had used cacodylate of sodium as a preparation associated with quinine hydrobromide, both given hypodermically.

DR. CHARLES HENDEE SMITH said there were 2 things that seemed important in the treatment of malaria. He supposed that in the Orient, where they could not control the patients, it was impossible to make them continue taking the quinine long enough, but he had found that one could not stop quinine and be sure there would be no recurrence if it is administered less than 6 months. It should be given in small doses for that length of time at least. He did not think that point had been sufficiently emphasized in the paper. Another point is, that rest in bed prevents the recurrence of paroxysms, as well as though quinine had been given. Then if one got the patient up he would have another chill, and one would find the parasite. The point was that one got a great deal more good out of the quinine if the patient was in bed. For that reason it was advisable to put the patient to bed for a week on full doses of quinine and then when he got up to keep on giving small doses of quinine for many months.

A member stated that at Camp Jackson, though the men were herded in a crowded condition, their health was good until October, when the epidemic of influenza broke out and Type 1 pneumonia appeared. During the convalescence from pneumonia they found the tertian in these men who were previously healthy.

DR. HERMAN SCHWARZ asked Dr. Rabinoff, what was the mortality in the cases she had seen. It was interesting that in Italy a great proportion of infant mortality is made up of deaths due to malaria.

DR. MURRAY H. BASS asked Dr. Rabinoff what her experience had been with reference to malaria in very young infants. He said that he had written a paper some 6 or 7 years ago in which he reported the case of an infant in whom the malarial parasites were found a short time after birth, and he had decided that the disease was of congenital origin. He thought it important to emphasize the fact that the malarial parasites might be found in the blood of infants a few hours after birth inasmuch as this possibility might be overlooked. The case that he reported had been treated for gastrointestinal disease and no one suspected malaria until the blood examination was made. There was nothing to suggest malaria except that the baby had a large spleen.

DR. RABINOFF, in closing, said that in regard to the treatment of malaria, in a series of experiments it was shown that quinine by the mouth was mostly excreted in from 3 to 6 hours, and in giving large initial doses at the time of the paroxysm, one controlled the organisms in the blood, but this had no effect on the spores developing later. For that reason it was necessary to continue giving the quinine at short intervals, and she had found that quinine must be continued for a long time after the acute attack was controlled. The spores were supposed to develop in 5 or 6 days and they were responsible for subsequent relapses. With reference to the question of the mortality among infants, she herself had not seen any deaths due to the malaria itself, except in one case with convulsions, in which death occurred during the attack, and in this instance the pathologist thought there was a direct obstruction of cerebral vessels which was responsible for respiratory failure. But in many cases there was extreme anemia and a state of lowered vitality due to malaria, which offered no resistance to other intercurrent infections. Among their chronic patients were children who ran a daily temperature of 100° or 101° F., and they gave a history of having had that condition for weeks. Rest in bed was very important. Many cases treated in the home without success, when admitted to the hospital and put to bed would have normal temperature

within a day, and there would be no further rise in temperature while they were in the hospital.

In regard to Dr. Bass's case of malaria in a young infant, Dr. Clarke of Johns Hopkins has examined the fetal and maternal blood in cases of malaria in young infants and found that in these cases there had been some trauma in the placenta, which permitted the organism to pass from the maternal to the fetal blood.

HEALTH CLASSES FOR CHILDREN.

DR. IRA S. WILE read this paper. (To be published in a later number of ARCHIVES.)

Discussion—DR. CHARLES HENDEE SMITH said he had very little to say except to congratulate Dr. Wile on his paper, for he knew what an enormous amount of work it represented. There were so many different aspects that might be discussed that it was difficult to know what to start upon. One of the most interesting points was that one can get results at once in almost any child that came into the class. The child gains in weight for a few weeks and then, as some one had said, "Grows weary in well-doing" and slumps. A continuous gain depends entirely upon the boosting ability of the man in charge of the class. It is necessary to reach people from many different sides—social, economic, etc. This kind of a class reaches the cause of ill health and malnutrition by educating mothers to take proper care of their children in the home. Caring for a child in the home gave much better permanent results than sending the child away from home for a short time, as when this is done the child very frequently falls back when he returns to his home. Sending a child away to give him a start might be all right but it did not correct the cause of the trouble. One reached the cause of the trouble by educating the mother and improving conditions in the home. There could not be too many of these classes. There should be one in every hospital and in every school. Until we can get the public school teachers to attack this problem we shall not have the kind of people that the country should have. Until the nation realized that the foundation of good health lay in education we would go on having hospitals and dispensaries, which have to do what they can of this kind of work.

DR. JACOB SOBEL said the most significant thing in connection with this paper was that Dr. Wile had started something, and by that he meant that Dr. Wile was a pioneer in starting classes for

children of the pre-school age in connection with hospitals. This was a subject in which he had been interested for many years. To show how little effect one pre-school age class had on this very large problem one need only stop to consider that there were approximately 475,000 children of pre-school age in New York City. It would require a large number of clinics and a large personnel to care for the children of this class. This was probably the most pressing question before the country today. The proper care of the pre-school child bore the same relation to the school child as the problem of prenatal care bore to the infant. How to care for these 475,000 children in New York was a serious problem. It was not a municipal problem alone, because the municipality could scarcely handle it. There were from 275,000 to 300,000 children of school age physically examined annually in New York City, and this required a large number of doctors and nurses. This being the case, one could readily appreciate what a working force would be required to examine 475,000 children of pre-school age. The only solution of the problem was along the lines in which Dr. Wile was working and in accordance with Dr. Smith's suggestion. If we are going to make any impression it was not only necessary to have municipal clinics and pre-school clinics, but these health classes must be associated with every hospital, dispensary, settlement, day nursery and school, etc. Dr. Wile not only laid emphasis on the treatment and follow-up of physical defects but said they paid attention to the mental condition as well. Dr. Sobel said he did not know just what Dr. Wile meant by that, but he believed this should include the emotional as well as the mental make-up. It was true, as Cardinal Newman said, "If you give me a boy until he is 7 years of age I care not who has him afterward." The care of the child at this most important phase of his life should not be overlooked. He hoped the time would come when the municipality would spend more money in this direction, for if they would spend more money on the pre-school child they would not require so much for the school medical inspection. Pre-school examinations could be carried out at community centers, at public and other schools, and the child prepared for school entrance and to assimilate knowledge; this would mean a saving for the children, a saving of expense to the municipality and a saving to the State and the Nation.

DR. WILE, in closing, agreed with Dr. Sobel that public money could not be spent to better advantage than in giving proper attention to children of the pre-school age.

Many times physical defects in children were passed over in the public clinics or by private practitioners. This was a point which needed stimulation of the attention. If they all got together it would be possible to make a slight dent on the whole problem.

BUTTER FAT AND THE CHILD'S WEIGHT.

J. H. LARSON, Secretary of the New York Milk Committee, made this presentation. (To be published in a later number of ARCHIVES.)

SERIC-SERUM FOR CONTROLLING HEMORRHAGE (*Presse Médicale*, Paris, Sept. 18, 1919). H. Dufour and Y. Le Hello noted that an anaphylactic reaction in a patient with hemorrhagic purpura seemed to modify the blood in such a way that the tendency to hemorrhage was arrested. This suggested that a therapeutic anaphylaxis might be induced which would arrest hemorrhages impossible to control by other means. They selected for this the method of passive anaphylaxis induced by injection of a small amount of serum from a rabbit in a state of anaphylaxis. They injected the rabbits several times at regular intervals with small doses of diphtheria antitoxin by the vein. They are bled the twenty-first day after the first injection, and their serum injected into guinea-pigs sensitizes the latter immediately, and induces manifest hypercoagulability. Injected subcutaneously in human beings, it almost immediately induces hypercoagulability and has thus arrested hemorrhage in numerous cases. Normal rabbit serum does not seem to modify the coagulation of the blood in man. A number of cases are described in which this seric-serum against hemorrhage, as they call it, arrested grave hemophilic and other postoperative hemorrhages, severe recurring uterine hemorrhage in a young woman, and fulminating epistaxis. They declare that nothing to compare with this prompt arrest of the tendency to hemorrhage has ever been realized with other measures. The seric-serum was injected in the dose of 10 c.c. and the effect was evident in about four hours, one hour or two hours in the different cases. In none of the cases were more than two injections needed.—*Journal A. M. A.*

DEPARTMENT OF ABSTRACT

WEBSTER, REGINALD: BLOOD CULTURE IN SUMMER DIARRHEA (Medical Journal of Australia, June 7, 1919, p. 460.)

In a series of 11 cases of summer diarrhea with blood in the stools, Webster states that 5 yielded a positive blood culture while 6 were sterile. In the 5 cases with a positive blood culture, the bacillus fecalis alkaligenes was cultivated in 3, while the bacillus dysenteriae was cultivated in 2. Of 16 milder cases of diarrhea, all were sterile—longitudinal sinus. Five c.c. of blood, obtained from the sinus when possible, and when not from the anterior jugular vein, were inoculated into 50c.c. of a bouillon, the basis of which was liver extract. Ox liver was utilized in making the meat infusion in order to obtain the advantage of the presence of bile salts. The medium was then prepared as ordinary broth, and rendered + 10 to phenolphthalein. In those instances in which growth appeared, the primary broth cultures were transferred to MacConkey plates; likely colonies were then selected for souring in glucose and mannite-litmus-peptone water, together with other available carbohydrates and litmus milk. C. A. LANG.

WALKER, ALLAN S.: CONGENITAL DEFECTS IN THE LOWER BOWEL RECURRING IN THREE SUCCESSIVE CHILDREN OF ONE FAMILY. (Medical Journal of Australia, March 15, 1919, p. 216.)

Walker reports 3 cases of congenital defects in the lower bowel recurring in 3 successive children of one family. A healthy woman, aged 30 years, gave birth to an apparently normal male child in October, 1915. In 36 hours the child showed great abdominal distension, the bowels had not moved and there seemed to be considerable pain. Examination revealed an imperforate rectum, though the anus and the rectum for 7 c.m. to 8 c.m. were normal. Under ether the abdomen was opened and the lower normal part of the rectum was found to end within the peritoneal cavity; the remainder of the rectum, the sigmoid and descending colon were absent. The ileum was drained as a means of relief for the pain. The child died 24 hours later.

In May, 1917, a female child was born. The rectum was patent as far as the finger could reach, but a similar condition

rapidly developed. On opening the abdomen a firm, cord-like structure, about 0.5 c.m. thick, was found running up from the occluded lower gut and attached to the abdominal wall by a small fold like a rudimentary mesentery. No large bowel was found, so nothing more was done. The child died in 18 hours.

In January, 1919, a third child was born. The child seemed normal, but within 24 hours there was abdominal distension, pain and temperature. Examination revealed a blind end in the rectum less than 5 c.m. from the anus. Considerable quantities of fluid rapidly collected in the peritoneal cavity and the child soon died. Operative interference was refused. The mother has one living healthy child, born 6 years before the first of this series, and has had no other pregnancies. The family history was entirely negative.

C. A. LANG.

BRONSON, E.: CATARRHAL JAUNDICE ASSOCIATED WITH INFLUENZA IN CHILDREN. (*British Journal of Children's Diseases*, April-June, 1919, p. 73.)

During the epidemic of influenza (1918), the author was impressed by the fact that she was seeing an unusually large number of instances of catarrhal jaundice in the medical out-patient department of the Hospital for Sick Children, Great Ormond Street, London. These cases were divided into 3 classes: (1) Children in whom jaundice followed exposure to influenza, but who did not develop it; (2) children who developed jaundice as a sequel to an attack of influenza; (3) doubtful cases in which there was no known exposure to influenza. She gave a short history of some 18 cases and reports that except during the influenza epidemic not more than 2 cases of jaundice a month were seen by her in the Out-patient Department.

C. A. LANG.

CERVONE, V.: DENTAL ANOMALY FOUND IN RACHITIC CHILDREN. (*Bullettino Scienze Mediche*, June, 1919.)

Besides the usual dental anomalies found in rachitic children an accurate study of the patients in the Pediatric Clinic of Bologna revealed one peculiarity hitherto not recognized. This is an exaggeration in size of the lower canines that actually resemble those of carnivora. Out of 54 subjects studied, 52 had this feature. Usually the anomaly is found more pronounced in children in

whom the rachitic characteristics are most evident. It is usually in the lower jaw and in the first teeth.

Regarding the explanation of this feature the author ventures to suggest that it might be a reversion or sign of degeneration—hereditary in rachitic stock. It might also be caused by a pathological process taking place in the tooth formation, due to changes produced in the tissues by rachitis.

The subject admits of further discussion and Cervone only offers this preliminary study in the hope that pediatricists will be interested.

C. D. MARTINETTI.

GAUTIEZ, A.: NEW TREATMENT OF INFLUENZA IN CHILDREN. (Accademie de Medecine, Paris, December 3, 1918.)

During the recent epidemic of influenza, particularly in cases showing cardiac weakness, Gautiez has been using twice a day a hypodermic injection of serum prepared according to the following formula:

Quinine bichloride, grammes 0.50; arrhenal (sodic dimethylarsenate), grammes 0.50; sterile physiologic serum, 400 cc. Results have been uniformly good.

C. D. MARTINETTI.

VALABREGA, M.: PRIMARY PNEUMOCOCCUS CEREBRAL ABSCESS. (Archivos Latino-Americanos de Pediatria, Nos. 1 and 2, 1917.)

A perfectly healthy boy of 7 became suddenly ill with convulsions characterized by clonic contractions of the left arm. Headache followed, and later vomitus, torpor and strabismus.

In the last 24 hours there was temperature reaching 42 C. Lumbar puncture disclosed a clear liquid under pressure but unlike meningeal fluid. On the 24th day of illness, the patient developed coma and Cheyne-Stokes respiration in addition to the other symptoms. Death followed. The autopsy showed a small globular abscess in the left frontal lobe containing about 100 cc. of dense greenish pus in which many pneumococci were present. The abdominal viscera were not examined on account of strenuous opposition on the part of the family.

Valabrega thinks that this pneumococcus infection may have reached the brain through the circulatory system.

C. D. MARTINETTI.

BOOK REVIEWS

THE PRACTICAL MEDICINE SERIES, 1919. VOLUME IV. PEDIATRICS. Edited by ISAAC A. ABT, M.D., Professor of Pediatrics, Northwestern University Medical School; Attending Physician, Michael Reese Hospital, with the collaboration of A. LEVINSON, M.D., Associate Pediatrician, Michael Reese Hospital. ORTHOPEDIC SURGERY. Edited by EDWIN W. RYERSON, M.D., Associate Professor of Surgery, Rush Medical College; Professor of Orthopedic Surgery, Chicago Polyclinic. Chicago. The Year Book Publishers.

Little but good can be said by the reviewer of this small volume as a compendium of pediatric and orthopedic progress for the year 1919; it covers the field. As its name indicates, it is a compilation of the world's literature, well edited and boiled down. In a word, it gives a rapid summary for the man who runs. Of especial interest are the abstracts of epidemic stupor, the disorders of nutrition, and the arthritides. It is well bound and printed, and will more than hold its own with the other seven volumes of the series.

THE DISEASES OF INFANTS AND CHILDREN. BY J. P. CROZER GRIFFITH, M.D., Ph.D., Professor of Pediatrics in the University of Pennsylvania, Philadelphia; Physician to the Children's Hospital of Philadelphia, and to the Children's Medical Ward of the University Hospital; Consulting Physician to St. Christopher's Hospital for Children, Philadelphia; Corresponding Member of the Société de Pédiatrie de Paris. With 436 illustrations, including 20 plates in colors. Volumes I and II. Philadelphia and London. W. B. Saunders Company, 1919.

This book appears in 2 volumes and contains almost 1,500 pages. It is a very full review of medical pediatrics, with just enough attention paid to the surgical and special branches to justify their inclusion. In these volumes Dr. Griffith has really compiled a compendium of various textbooks, and has taken freely facts from foreign and domestic pediatric journal literature. He has also offered his own wide experience in private practice and in hospital work. This adds to the general rounding out and

elaboration of the book. An attractive semi-departure in a work of this kind are the references in footnote form which appear throughout. A reader, desiring to consult the original, is therefore enabled to do so with ease and despatch. It is profusely illustrated with 436 illustrations, which include 20 colored plates. Those showing colored drawings of the stools are especially fine and vie with those showing vaccination, the Schick test, and Koplik's spots. Needless to say, it is well printed and well bound. We feel that as a book of reference it is absolutely reliable, up to date and offers valuable data to both the student and to him who reads and runs.

DISEASES OF NUTRITION AND INFANT FEEDING. BY JOHN LOVETT MORSE, A.M., M.D., Professor of Pediatrics, Harvard Medical School; Visiting Physician at the Children's Hospital; Consulting Physician at the Infants' Hospital and the Floating Hospital, Boston, AND FRITZ B. TALBOT, A.B., M.D., Instructor in Pediatrics, Harvard Medical School; Chief of Children's Medical Department, Massachusetts General Hospital; Physician to Children, Charitable Eye and Ear Infirmary; Consulting Physician at the Lying-In Hospital and at the Floating Hospital, Boston. Second Edition revised. New York. The Macmillan Co., 1920.

In the reviewer's opinion, this book still remains the best book on metabolism, nutrition and infant feeding written in the English language. It has preserved the style, the ideas, and the ideals of the first edition, published in 1915, and the authors have added new data which brings the literature up to April 1, 1918. The very few real additions to scientific pediatrics since that date have, therefore, not been included. Thirty-eight pages have been added to this edition. In addition, an author's index is a feature, thus facilitating reference work. Another feature of interest are the captions at the top of almost every page, allowing one at a glance to see what the page contents will be. For the man who wants a complete review of recent pediatric progress plus the editorial and vast professional experience of its two authors, here is a book without a peer.

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS

SOME REMARKS ON CRANIAL SINUS THROMBOSIS IN CHILDREN.*

By SEYMOUR OPPENHEIMER, M.D., F.A.C.S.,

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Hospital, and Gouverneur Hospital, etc., etc.

New York.

In general it may be said that the symptomatology of sinus thrombosis in children is in a measure that of the condition in adults. It may, however, be of value to the pediatrician that we go over the subject, for to the pediatrician usually falls the primary observation and tentative diagnosis of the condition in our little patients, and it is of the utmost importance that he

*Read before the Section on Pediatrics, New York Academy of Medicine, December 11, 1919. For discussion see page 53, January, 1920, ARCHIVES OF PEDIATRICS.

be sufficiently acquainted with the condition to early recognize its development, and the resulting necessity for prompt operative intervention by the otologist. The greatest problem which confronts us is not so much in etiology or in operative technic, as its early diagnosis. With the usual symptoms as they appear this is often most difficult and many times impossible.

Historical: Hooper, as early as 1826, correctly recognized both sinus phlebitis and sinus thrombosis. Other early observations recorded are those of Abercrombie, 1835; Bruce, 1840; Virchow, 1845; and Sedillot, 1849. Bouchut, Von Dusch, Knapp, Lapersonne, Coupland, Verneuil, Reverdin and other writers added further observations and case reports on the subject in succeeding years. In 1893 MacEwen published his classical work on pyogenic infectious diseases of the brain and spinal cord.

There are 2 recognized forms of thrombosis—primary or marasmic; and secondary, or infective, sometimes termed inflammatory. Marasmic thrombosis occurs much less frequently than the infective, and is almost invariably located in the longitudinal, rarely in the lateral, and still more rarely in the cavernous sinus. It occurs in weakly people, prostrated by exhausting diseases. Occurring most often at the 2 extremes of life, it is met with in the young most frequently during the first 2 years of life and more especially during the first 6 months of infancy. Exhausting diarrhea is one of its most potent causes in children, although acute and chronic pulmonary affections also play an important etiological part. Gowers believes that primary sinus thrombosis is of frequent occurrence, and it is not an uncommon cause of infantile hemiplegia. It may occur in connection with chlorosis and anemia, the so-called autochthonous sinus thrombosis. Of 82 cases of sinus thrombosis in chlorosis, 32 were in the cerebral sinuses. The longitudinal sinus seems to be most frequently involved in these latter cases usually associated with venous thrombosis in other parts of the body. In the terminal stages of malignant disease, tuberculosis and other chronic diseases, there may gradually develop thrombi in the sinuses and cortical veins, to which stagnatory thrombotic processes Virchow's name has long been attached, "the marasmic or marantic clot." It is seen at times in conditions of infantile atrophy, and sometimes occurs in the course of

such acute infections as pneumonia, pertussis, diphtheria, and nephritis. The actual cause when thrombosis occurs is a condition of lowered vitality leading to feebleness of the circulation and an altered condition of the blood. In infants, profuse diarrhea diminishes the quantity of blood and removes a large portion of serum from the brain as well as from other parts of the body. Consequently there is a diminished volume of the cranial contents, shown at first by depression of the fontanelles and subsequent overlapping of the cranial bones at their sutures.

In this state the cerebral vessels and sinuses are apt to dilate, causing a further retardation of the already slow flowing blood stream, which, coupled with the enfeebled heart's action and the inspissated blood, tends to establish thrombosis of the sinuses. Holt considers marantic sinus thrombosis very rare after 5 years of age. Jansen and Heine pointed out that non-septic sinus thrombosis may occur as the result of a mechanical compression of the sinus wall, as from a cerebral tumor, or pressure from pus and detritus in a purulent mastoid cavity. Lebert (1854) and Tonnele were among the first to recognize this condition clinically.

The diagnosis of primary sinus thrombosis in children is difficult and is seldom determined during life. There are none of the characteristic symptoms of temperature which are found in infective thrombosis; oftentimes the symptoms are prone to be masked by the disease which precedes it and which is the cause of the thrombosis. In a larger number of cases the disease is latent in children, the symptoms few and uncertain and very rarely is a positive diagnosis made.

Pathology: Marasmic thrombosis, though generally confined to the longitudinal sinus, may extend into other sinuses, so that the lateral, sigmoid and even the cavernous sinus and jugular veins may become implicated in its extension. In only comparatively few cases is the superior longitudinal sinus alone affected. In the majority of cases reported, where the thrombosis extended further than the longitudinal sinus, both lateral sinuses became involved. The clots are dense, resistant, stratified and non-adherent to the vein walls. They rarely occupy the entire lumen of the vessel and tend to become organized or

absorbed, and very rarely undergo disintegration. In chronic cases the clot becomes sufficiently tunneled to permit re-establishment of the circulation. As a result of the thrombosis there is great congestion of the meningeal and cerebral vessels with edema, the degree depending upon the extent and location of the clot. The capillaries in the affected area of the cerebral cortex burst, giving rise to innumerable minute hemorrhages, which, along with the congestion and edema, produce cerebral softening. In severe cases the ventricles become distended with serous fluid and rarely the sero-sanguineous effusion passes into the retro-ocular tissue, with a resultant exophthalmos. As a rule the frontal lobes are least affected by this softening process, the parietal and occipital lobes being the ones generally involved. Meningeal hemorrhages from marasmic thrombosis are not uncommon. Where recovery ensues, atrophy and induration of the affected area are stated to be the consequence.

Symptomatology: Symptoms of marasmic sinus thrombosis, unaccompanied by hemorrhage, are few and uncertain in the majority of cases in which this lesion is found postmortem. Often the disease is wholly latent. Even when symptoms are present they are not often sufficiently characteristic to permit a diagnosis during life. The symptoms are those of meningeal or cortical irritation and are indistinguishable from symptoms produced by more common conditions. In the chlorosis cases the head symptoms have been marked as a rule.

Children affected with marasmic thrombosis are prone to convulsions. These convulsions are usually general and are accompanied by unconsciousness. Bouchet observes that convulsions occurring at the beginning of an acute malady are not of serious import, usually heralding one of the exanthemata or a phlegmon; but when they occur at the end of an acute and exhausting disease, or during a chronic illness which has greatly reduced the little patient, then marasmic thrombosis is to be feared. Occasionally the convulsions are unilateral, and may even be confined to one member. Gerhardt and Petrens have observed an inequality in the feel of the jugulars of the 2 sides among marasmic children. Epistaxis is an occasional symptom. Strabismus, tremors of the lower extremities, contractures and muscular rigidity are frequent and probably due to a menin-

gitis. Thrombosis of the retinal vessels is occasionally observed. The prognosis is bad in marasmic thrombosis and a majority of the cases die in a few days.

In view of the impossibility of a definite diagnosis in most cases, the treatment must be wholly symptomatic. Roborants and stimulants are indicated, a position in bed should be assumed which is favorable both to the arterial and venous circulations, care taken that the clothing does not constrict the neck. The internal administration of potassium iodide and calomel has been recommended in the autochthonous forms, but no treatment is likely to prove of any avail.

Secondary Inflammatory or Infective Sinus Thrombosis: Secondary or infective sinus thrombosis is much more frequent than the primary or marasmic form and follows extension of inflammation from parts contiguous to the sinus wall. It is the term usually applied to thrombosis which arises from invasion of the sinuses by pathogenic microorganisms.

It occurs almost as frequently in children as in adults. It generally affects one of the dual sinuses, while marasmic thrombosis affects the single median or azygos sinuses. It is local in origin, secondary to some inflammatory lesion of infective character and occurs in the sinus nearest the seat of the primary disease. Infective thrombosis is often associated in its later stages with meningitis, and not infrequently with small cerebral or cerebellar abscess.

In recent years a distinct advance has been made in our knowledge of the etiology, diagnosis and treatment of the intracranial complications of suppurative otitis media and investigations made have demonstrated with clarity that aside from traumatism, epidemic cerebrospinal meningitis and tubercular meningitis, the majority of all cases of intracranial infections take origin in the ear. The nasal accessory sinuses are accountable for the smaller percentage of such infections.

The 3 chief causes of sinus thrombosis may be stated to be sepsis, damage to the vessel wall, and stasis. In children, infective sinus thrombosis may follow skull fractures, scalp wounds, anthrax of the lip, mouth, nasal and orbital cavities, erysipelas of the face and forehead; furunculosis of the lips, face or neck.

But by far the most frequent cause is a suppurative middle ear lesion. Observations demonstrate that sinus thrombosis affects males more frequently than females; the right lateral sinus more often than the left. This is probably due to the right sinus usually being larger and approximating the mastoid cavity proper more closely. In infective sinus thrombosis, the lateral sinus is most frequently involved. In a series of 57 fatal cases in which ear disease caused death with cerebral lesions, lateral sinus thrombosis existed in 22 (Pitt). Tubercular caries of the temporal bone is often directly responsible, or the disease may extend direct from necrosis on the posterior wall of the tympanum. The thrombus may be small or may fill the entire sinus and extend into the internal jugular vein. In our experience in about one-third of the cases operated the thrombus was suppurating.

The cause of the thrombosis may be from direct infection through the sinus wall from a perisinus abscess, or by extension of the thrombosis and infection of the small veins from the middle ear or mastoid, which become thrombosed through the osteitis accompanying an acute infection. The latter mode of infection is probably the more common and is well illustrated in those cases where thrombosis of the jugular bulb is found in acute suppurative otitis media, without involvement of the mastoid (primary jugular bulb thrombosis).

A factor in the production of sinus complications is the natural feebleness of the rate of blood flow in the veins and the tendency to localized lacunæ of blood stagnation resulting from the differences of caliber of the vein as it pursues its tortuous course in this location. In reviewing various published reports on the subject of the relative frequency of intracranial complications of otitic origin, about 35 per cent of these complications were in the nature of a thrombosis of the cranial sinuses.

While infective sinus thrombosis may be a less frequent complication in children than in adults, a study of the statistics of institutions treating large numbers of cases of otitic disease shows 15 per cent occurred in children under 10 years of age.

Sinus thrombosis may develop not uncommonly as a complication of a diphtheritic infection of the middle ear or of scarlet fever, but more often from measles and influenza.

Anatomy and Pathological Anatomy: At this point it may be of value to review, in a general way, the gross anatomy of the brain, particularly as to its venous supply, after which the difference between the brain anatomy of the child and of the adult may be taken up, with reference to the question of sinus thrombosis.

The superior cerebral veins collect the blood from the upper portions of the cerebrum, and after anastomosing with one

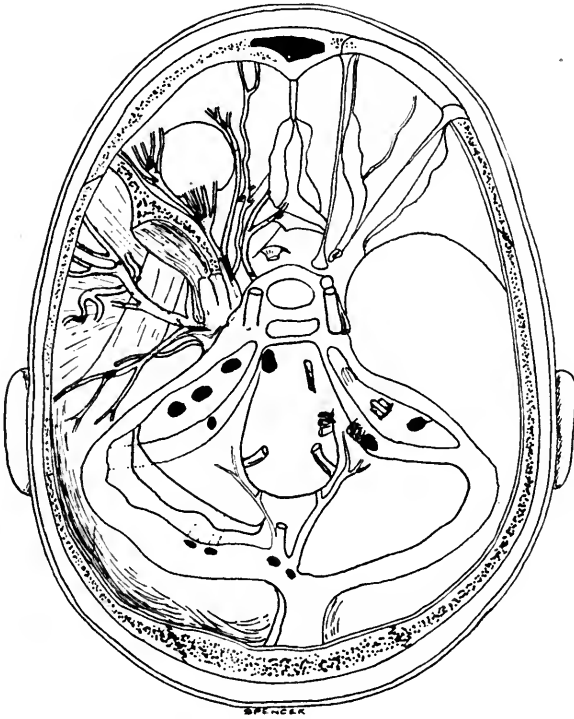


FIG. 1—Horizontal Section Showing Communication of the Lateral with the Transverse and Cavernous Sinuses.

another and with the inferior cerebral veins, empty into the superior longitudinal sinus. The inferior cerebral veins enter the lateral, cavernous and superior petrosal sinuses. The middle cerebral vein after being joined by branches from the frontal and temporosphenoidal lobes, pours its blood into the cavernous sinus.

The sigmoid sinus is a continuation of the lateral sinus and

is that portion which lies in the sigmoid groove. It is joined by the inferior petrosal sinus and forms the internal jugular vein. The sigmoid sinus receives blood from the superior petrosal and occipital sinuses, also from the superior longitudinal and straight sinuses by means of the lateral.

It is in the lateral and sigmoid sinuses, together with the internal jugular vein, that a thrombosis is most frequently found, when the middle ear and mastoid cells are involved, although the other sinuses that are in communication with

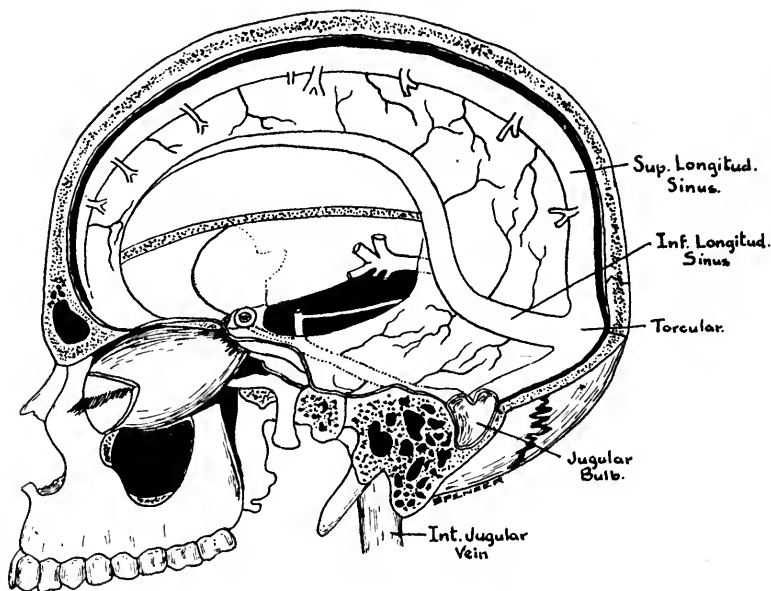


FIG. 2—Sagittal Section Showing the Venous Sinuses.

them, especially the inferior and superior petrosals, are liable to be affected.

Small veins from the mastoid cells and tympanum also enter the sigmoid sinus, more especially at the knee. A thrombus formed in the sigmoid sinus may extend to the petrosals and to the cavernous sinus as well.

There is an inconstant communication between the vessels of the external portions of the skull and the sigmoid sinus by means of the mastoid and posterior condylar veins. The latter connect the sigmoid sinus with the vertebral veins and the deep veins in the posterior part of the neck.

The lymphatics in the scalp enter the mastoid, parotid and occipital lymphatic glands. Some of the facial lymphatics are superficial, others deep.

The topography of the temporal bone and its landmarks vary to a considerable extent in children from the adult temporal bone, and it is essential to bear in mind these variations when operating in the young, as they not only directly influence the method of opening the mastoid but also the pathological changes following chronic suppurative changes in the tympanic cavity.

At birth and for the first year of life, the only rudiment of an osseous external meatus is the superficial depression situated

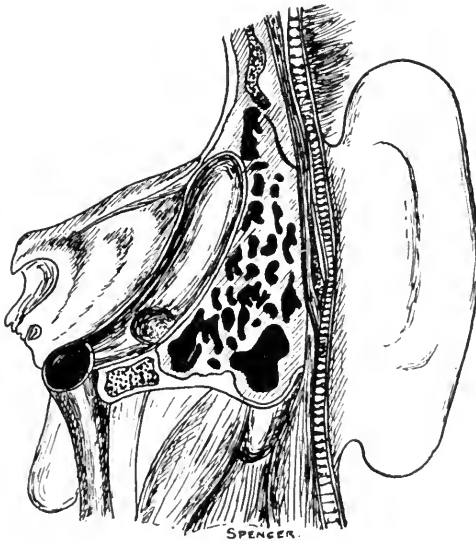


FIG. 3—Trans-section Showing the Relation of the Lateral Sinus to the Mastoid Cells.

in the middle of the outer and lower part of the pars squamosa and just posterior to the root of the zygomatic process. This depression, to which the name fossa auditoria may be appropriately applied, has the rudiments of the mastoid process posterior to it, its surface is smoother and its substance denser. It also contains fewer foramina for the transmission of blood vessels than the surrounding bone.

At the period of birth, the portion of the bone forming the fossa is not more than half or three-quarters of a line thick and the membranous meatus is attached to the outer surface; the

dura mater and the middle cerebral fossa to the inner surface. Its structure is far from being compact or dense and in its substance the blood vessels from the meatus communicate with those of the dura mater.

As the bone approaches maturity, the fossa assumes an oblique position and forms the upper wall of the external auditory meatus, while it is separated from the cavity of the middle

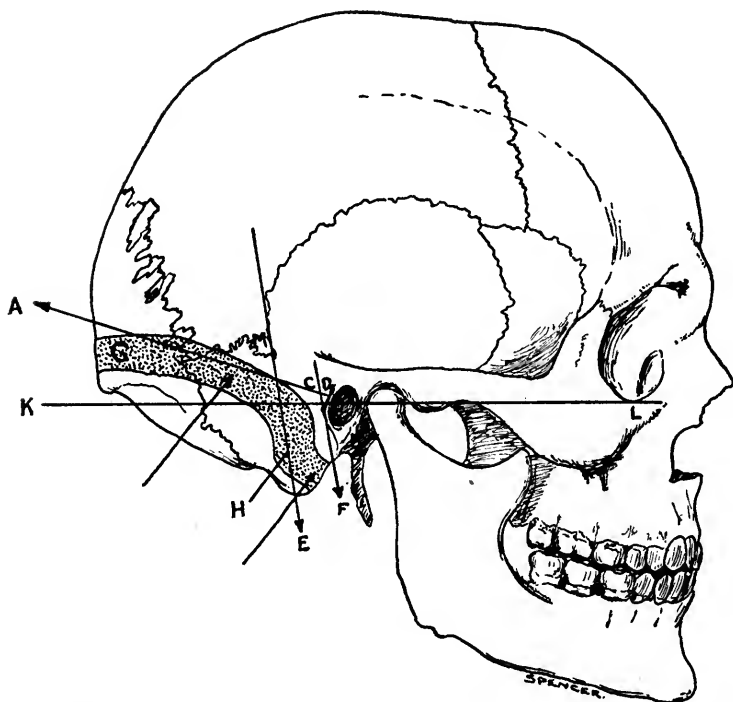


FIG. 4—Topography of the Lateral and Sigmoid Sinuses, on the Side of the Skull. Position Indicating Points at which Compression Plugs are to be applied, between which the sinus wall is to be incised. (Kopetsky: "The Surgery of the Ear.")

cerebral fossa by a dense layer of bone in which cells connect with the tympanic cavity. In the adult, the fossa auditoria has nearly lost its oblique direction and becomes a horizontal lamina of bone.

While the mastoid process does not exist in the infant, it is indicated by a small tubercle without pneumatic cells. The antrum lies superficially. The fissures petrosquamosal and squamoso-

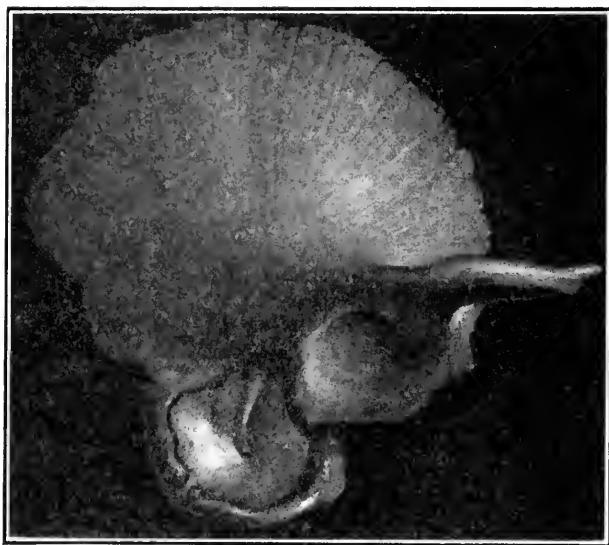


FIG. 5—External Surface of Temporal Bone of an Infant.

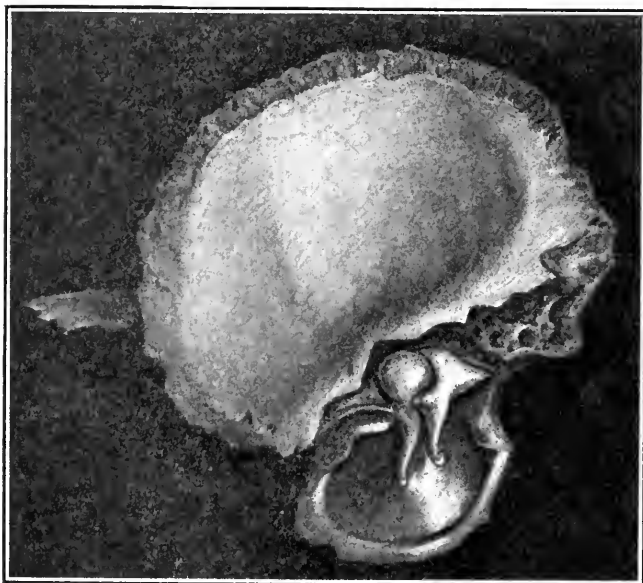


FIG. 6 Internal Surface of Temporal Bone of an Infant.

mastoideal are present. The internal auditory canal is wide and shallow and the landmarks at the fundus of the canal are easily discerned. The contour of the cerebral and the cerebellar semi-circular canals are more prominent than in the adult. The fossa subarcuata is large. The sigmoid groove in children is considerably flatter than in adults and owing to its shallowness the lateral sinus does not project so far forward as in adults. In adults the outer wall of the sinus on cross section is about the form of a half circle, but in children, on the contrary, it is shaped more like a flat arch, while the inner wall of the sinus stretches almost straight across the sinus. In children then the outer wall of the sinus lies considerably nearer the inner wall than in the adult.

As with the adult, the depth of the middle cranial fossa of course varies, but even in the child one can always be positive that it lies above the supra-mastoid spine. At birth, the external wall of the epitympanic space is in the same position as occupied by the inferior wall in the adult, the variations at this point resulting in the changes assumed by the direction of the pars squamosa during the developmental period. As a result of this, the vault of the tympanic cavity is readily entered immediately above the superior attachment of the membrana tympani, but in making the incision through the superficial soft tissues, in performing any postauricular operation at an early age, great care must be taken not to make too much pressure, as the knife may pass through the squamous suture into the cranial cavity, as the suture is not completely closed until a later period and simply presents a large opening in the osseous structure filled with fibro cartilage. For the same reason care should always be exercised even in stripping back the integument and periosteum.

An infective process may extend within the temporal bone through the smaller veins whereby the latter become involved with septic thrombi, which gradually extend to and infect the sinus, or the infection may extend by contiguity, directly through the internal table to the walls of the blood-vessel, where its further advance is characterized by sinus wall infection, and then into the blood stream, with thrombosis resulting. According to Boenninghaus, thrombosis may occur from infection located within the labyrinth. In these cases, the sinus is usually

affected below the knee, or through involvement of the superior or inferior petrosal sinuses. In still another group of cases, infection proceeds from a labyrinthine infection directly toward the bulb through involvement of the lymph spaces of the middle ear or through a thrombus extension from the internal auditory vein.

From the tympanic cavity proper a thrombosis of the jugular bulb may take place from direct infection through dehiscences in the floor of the tympanum. In children especially, the proximity of the dome of the jugular to the tympanic floor allows of a primary thrombotic process in the jugular bulb, the infection extending direct from the middle ear.

Many instances have been reported of primary jugular bulb thrombosis. Boenninghaus and Korner report cases wherein the infection entered the jugular bulb from the tympanic cavity proper through involvement of the plexus, along the anterior wall of the tympanic cavity.

Phillips concludes that phlebitis and thrombosis of any part of the lateral sinus and internal jugular vein may take place as follows: through anatomical dehiscences in the bone tissue which covers its parietal surface, thus affording easy access to the pathologic process; through the direct extension into its walls of the active purulent lesion in the bone; through involvement of the smaller veins in the diseased bone, or through the involvement of the intermediate anastomotic veins in the thrombotic area.

With the sinus walls the seat of an inflammatory lesion and after the process has penetrated to the inner endothelial blood-vessel lining, a deposit of fibrin results in the lumen of the sinus consequent upon the inflammation, the fibrin being derived from the blood current. This deposit attaches to the vessel wall at the site of the lesion, forming what is designated pathologically as a "white wall thrombus."

The parietal thrombus in time enlarges with narrowing of the lumen of the vein until finally complete occlusion may result. The fibrin next becomes admixed with coagulated blood and assumes the form of "red obstructive thrombus," which may occlude the vessel's course for a variable distance. In a backward direction, the thrombus may extend and involve the superior petrosal sinus, the mastoid emissary vein, the torcular

Herophili, the longitudinal sinus and even the lateral sinus of the opposite side; while in the downward direction it may involve the inferior petrosal and cavernous sinuses, the ophthalmic vein, and after traversing the jugular bulb, continue throughout the jugular vein and its tributaries.

Thrombi, both of the parietal and the obstructive types, may be either infected or aseptic in character, the latter of more rare occurrence by far. If the thrombus is not infected, it becomes organized through the advent of connective tissue. On the other hand, if it is infected, it eventually breaks down, spreading the infection along the sinus walls to a variable extent.

Symptoms: The symptoms of lateral sinus thrombosis are fairly constant, although in children they may be much masked by the presence of some underlying acute infectious diseases. Temperature is the most important general symptom of sinus thrombosis and young children particularly are likely to have rises which are excessively high. A perisinus abscess may cause a temperature of a very septic type, i. e., sudden high rises alternating with sharp remissions; the whole clinical picture may be such as to suggest a sinus infection, but these symptoms may entirely subside after the operative removal of the diseased focus external to the sinus, i. e., a mastoiditis. The mere presence of a high temperature in children is a less important indication for operation than in adults, but when its presence is persistent in conjunction with an acute mastoiditis and a pyelitis, a pneumonia or an influenza can be excluded, operation is justified even although a blood examination fails to show a bacteriemia. Chills are absent as a rule, although the hands and feet are frequently found to be cold. An important point in a case under suspicion is the taking of 2-hour temperatures in order to accurately note the varying oscillations. Typical cases occasionally present themselves where the temperature remains steadily high without much remission. In older children, there may be headache, pains in the occipital region, and tenderness upon palpation along the jugular vein, due to lymph node enlargement, may be present. A diagnostic sign of importance I have observed to be a unilateral enlargement of the lymph nodes at the junction of the facial vein with the internal jugular. The cord-like feel along the anterior border of the

sternomastoid is a symptom that I have seldom noted even in cases where the jugular was markedly thrombosed.

Nasal hemorrhage is frequent, due to the fact that the venous blood from the nasal passages is discharged into the superior longitudinal sinus, and the stasis of the venous circulation in the nose caused by obstruction of the sinus leads to hemorrhage. From the same cause, veins passing in from the anterior fontanelle to the temples and auricles may be dilated and prominent. Drowsiness is a general accompaniment of an acute infectious process, but the state of well being (euphoria) so frequently seen is oftentimes very deceptive and is apt to throw one off their guard.

Severe persistent headache may excite the suspicion of a complicated meningitis, particularly when associated with vomiting, crying out in the sleep, somnolence and possible coma.

Metastasis is not uncommon. Local symptoms depend largely upon the extent of the sinus affected. Facial cyanosis and dilatation of the temporal and facial veins, with epistaxis, suggests an involvement of the superior longitudinal sinus.

Dilatation of the cervical veins and the possible hardening of the internal jugular vein, with or without edema behind the mastoid process, suggest invasion of the lateral sinus. A sign of much diagnostic significance is the presence of a postmastoidal edema, indicating a blocking of the mastoid emissary vein.

A symptom which I believe I have been the first to describe as occasionally present has been dysphagia. Upon examination of the throat, there is found a unilateral enlargement of the lymphoid tissue along the posterior fold of the pharynx. This symptom, in connection with the temperature, has in its early stages suggested a possible beginning throat infection as the factor present, but subsequent observation has cleared up this point. In the latter stages of the disease, edema about the orbit and a protrusion of the eye on the affected side indicate an involvement of the cavernous sinus.

It must be borne in mind these local signs cannot be relied upon alone as a means of diagnosis, but their close association with a more definite general symptomatology places upon them their dependable value.

The cases presenting the greatest difficulty of diagnosis are

those where some acute infectious disease is associated with the otitic suppuration. The temperature curve of malaria is much akin to that of a sinus thrombosis, but in the former case a leukopenia is present and the blood examination may disclose the malarial parasite.

The external jugular vein on the diseased side may be less distended than on the opposite side, since, owing to the thrombus present in the lateral sinus the internal jugular vein is less full than on the normal side, and the blood from the external jugular vein can flow more easily into it. Optic neuritis is present in a fairly large proportion of cases.

Cases of primary jugular bulb thrombosis, when occurring in infants and young children, present typical symptoms, inasmuch as no disease of the mastoid is present and furthermore the systemic symptoms are similar to those which accompany pneumonia, influenza, pyelitis and affections of the gastrointestinal tract. The chief symptom of thrombosis of the jugular bulb is a sudden and rapid rise in temperature in a case of middle ear suppuration to above 104° F., followed by an equally precipitous decline. Thereafter the temperature curve fluctuates after the manner of the first rise, during which time the variations in the pulse rate follow the temperature. There is usually no distinct chill, but the hands and feet may be cold when the temperature rises; meanwhile during the earlier remissions the child appears quite normal, playing with its mates and taking liberal nourishment. Later on, when the bacteriemia becomes more pronounced, prostration ensues and all the symptoms of the sepsis become apparent.

Fundus examinations may show a neuroretinitis in some cases. Crowe of Baltimore lays some stress from the diagnostic standpoint on being able to produce choked disc by compression of the internal jugular vein. I have never been able to corroborate this test.

In every case of mastoiditis, lateral sinus thrombosis is always a possible complication. Its relatively high mortality, with the absolute necessity of prompt operative intervention to prevent a general pyemia, demands that all factors that will in any way aid in its early recognition should receive the most careful attention.

In establishing the diagnosis of sinus thrombosis, it is of

course essential that all other diseases which might cause a like symptomatology should be definitely excluded. Among such may be mentioned pneumonia, typhoid fever, acute endocarditis, malaria and certain cases of scarlatinal infection—their distinguishing features frequently demand the close cooperation of the otologist and the experienced pediatrician.

In infantile hemiplegia, sinus thrombosis should be considered. In a series of 78 autopsies, reported by Starr and Westcott in infantile hemiplegia, sinus thrombosis was found in 5. All cases require an exhaustive consideration of the entire symptomatology and above all taking advantage of the aid given by blood cultural examinations.

A high temperature, continuing several days after a mastoid operation, especially when the operative findings have disclosed areas of necrosis of the bony covering of the lateral sinus, and examination of the blood shows a bacteriemia, is indicative of an infective process constituting a sinus thrombosis and demands prompt exploration of the sigmoid sinus. An occluding thrombus occupying the lateral or sigmoid sinus may exist without producing any symptoms referable to the internal jugular vein.

Blood examination furnishes reliable data in many cases. In the early stages of thrombosis, the blood shows as a rule an increase in the number of white cells. The increase is rarely over 20,000. When the thrombus is infected or suppurating, a bacteriemia may be demonstrated by blood culture, but in many cases a clinical diagnosis may be positively made before a positive blood culture can be obtained. Frequent reports upon the blood examinations in these cases have proven that thrombosis may exist without a characteristic blood picture, but a positive blood culture is, of course, absolute evidence that the pathogenic organisms have entered the circulation and constitute an indication for immediate operation. A negative blood culture, however, does not necessarily mean that the sinus is not involved.

In studying the bacteriological flora in a large series of cases of aural infection, which came to operation, in all the streptococcus or the streptococcus mucosus was found.

In smear examinations of aural discharges, streptococcus is probably the most frequent of the various organisms. Its differentiation from the pneumococcus is at times difficult, par-

ticularly in the light of Rosenow's contention as to their transmutism.

In a previous communication the conclusions reached were that the detection of a bacteriemia should be possible in every case of sinus thrombosis at some time during the course of the disease, although it is possible that as the result of various causes, such as a sterile thrombus, situated below the infected clot, for a time at least the bacteriemia might not become evident; or the culture may be taken before the bacteria are thrown off into the circulation, whereas if it were taken a few hours later the organisms would be found.

After a mastoid operation, where sinus thrombosis is suspected, but where symptoms are not sufficiently definite to warrant opening the sinus, and a blood culture has given negative results, it is most essential that subsequent cultures be taken. The rule can be laid down that in the presence of streptococci in the blood stream there is a septic focus and that further operative measures are necessary.

In a case where the sigmoid sinus has been attacked but the jugular vein has not been ligated, the persistence of a positive blood culture is an imperative indication for ligation of the jugular vein. Should positive cultures remain after the jugular ligation it would be suggestive of a bacterial infection of the endocardium or a metastatic process in the lung.

In an experience dealing with approximately 150 cases of sinus thrombosis, I have never observed an infection due to any organism other than the streptococcus or the streptococcus mucosus. This point has proven in many instances of great value in the expression of an opinion, and shows the importance of a culture from the pus contained in the mastoid process at the time of operation.

In a number of these cases, the mastoid infection was of the pneumococcus type. After the mastoid operation, symptoms presented which were suggestive of a complicating sinus thrombosis. Blood cultures were negative. Where operation was not advised on the sinus in these cases, a pneumonia, erysipelas or some other complicating condition developed which explained the symptomatology so much akin to that of a sinus thrombosis. One can see therefore the diagnostic significance of a negative blood culture in connection with a non-streptococcus type of infection.

Prognosis: The prognosis of sinus thrombosis in children depends upon the duration and extent of the disease and upon the stage at which its progress is checked by surgical interference. The earlier the operation the lower the mortality. A localized thrombosis of short duration, located in the sigmoid region and therefore unaccompanied by involvement of the petrosal sinuses, or the jugular bulb, when promptly operated upon, usually results in recovery; during the later stages after the thrombus has invaded the tributary vessels, the torcular, the bulb or jugular vein, the prognosis is less favorable. After metastatic processes have developed in the lungs, brain, joints or heart, the mortality is extremely high.

Treatment: The treatment of sinus thrombosis of otitic origin, is entirely surgical, and will be touched upon only briefly in this paper, more by way of outlining to the pediatrician the operative procedure in a general way, rather than a detailed and technical exposé of the various steps in technic, of interest more to the aural surgeon perhaps than to his confrères in the domain of pediatrics.

Where it has not already been done, the mastoid operation should be performed with due regard to the differences of the anatomy of the parts in the child as compared with that of the adult. The sigmoid sinus should be exposed along its lateral mastoid portion and the wall of the vessel incised, compression of the vessel wall being made above and below the point of incision. A wire ring curet is then passed into the lumen of the vessel through the incision and an attempt is made to remove the clot both from the torcular and bulbar ends. Free bleeding should be established from both directions, after which the outer wall of the exposed sinus should be excised and compression plugs placed above and below to control the hemorrhage. The question as to primary jugular ligation is an academic one and the pro and con of the subject are hardly of interest to this audience. In general it might be said, however, that should any difficulty be experienced in establishing promptly a return flow from the bulbar end of the sinus, it is advisable to cease further manipulation in this direction owing to the possibility of dislodging thrombotic material, and promptly ligate the jugular vein in the neck. The problem of jugular ligation with or without excision of the neck vein is one for determination by the otological surgeon. The operative procedures are attended by the cure of a great many cases

which would otherwise terminate fatally; hence the importance and the urgent necessity for early diagnosis, in which the pediatrician can co-operate to excellent advantage with the otolaryngologist, to whom of necessity falls the operative treatment of the given case.

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SEASONAL INCIDENCE OF TETANY—A REPORT OF 47 CASES.

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Tetany is most commonly observed in the spring. The unusual number of cases seen in March and April of 1918, in the outpatient service of the Babies' Hospital, prompted this study with the view of finding some cause for the increase of cases in this particular year. No definite conclusions can be drawn from this study, but some of the data presented here may be used for some future studies along these same lines.

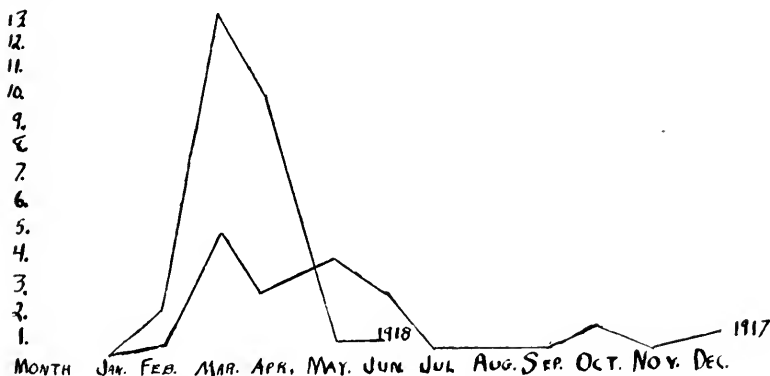


FIG. 1—Number of Cases per Month for Eighteen Months, 1917-1918.

In an examination of the records of the dispensary for the last 18 months, 47 cases of tetany are recorded—the hospital cases were excluded as they are largely selected and the number of admissions would have no bearing on the seasonal incidence. Doubtless many cases, especially latent types, escaped detection in the outpatient department. No tests were made at any time for electrical hyper-irritability. Of these 47 cases, 12 were admitted in March, April and May, 1917, and 24 during the same period in 1918.

The winter of 1918 was exceptionally severe, long periods of weather below 10° F. In addition there was a serious shortage of coal, resulting in an increased use of gas for heating among the poorer classes. The conservation of heat led to the keeping

of windows and doors tightly closed; this resulted in a minimum of ventilation, plus vitiated atmosphere. These periods of intense cold prevented the infants and younger children from having the customary amount of sun light and outdoor air.

Among our Italian population, particularly those who have but recently arrived in this country, there is a dread of the cold air of winter. Although only a small per cent of our out-patients are Italian, of the entire number of cases, 19 or 40 per cent occurred among this nationality. Italians of New York are from the central and southern parts of Italy and are not accustomed to cold weather; this accounts for their remaining indoors so much in the winter.

Tetany is a rare disease in private practice and is infrequently seen among the well to do. Tetany is a rare disease in our Southern States and uncommon in California. Infants of these localities have the benefit of more sunlight and fresh air throughout the year than children living in New York. Tetany is rarely seen in the summer months in New York. In the chart illustrated here it will be noted that in 47 cases none were seen in July, August, or September. Cases in the spring, as a rule, clear up with the coming of longer days with longer periods of out-door air and sun for the infant.

The association of rickets and tetany has always been considered a close one. Many cases of tetany are encountered which have no evident rachitic lesions; in these it has been assumed that the rachitic changes were so early that they could not be demonstrated. In only 15 cases in this study were rachitic manifestations noted. Many of the most marked types of rickets never show any symptoms of tetany and the most marked cases of tetany frequently have no demonstrable rickets. There must be other factors in the etiology as important as the rachitic etiology.

It is to be regretted that the home conditions of these cases were not investigated and information obtained regarding number of people per room, amount of light, whether shaft or direct, type of heating apparatus, number of hours gas is burned and the amount of CO₂ present.

The records relating to the number of hours out of doors each infant had per day are incomplete; this is explained by the

fact that this information is not commonly obtained when the history is written. In only 9 cases is there data relating to this; in 7 cases the infants were indoors the entire winter and in 2 all but 4 hours a week. One infant, 2 months old, was out of doors for the first time when the visit to the dispensary was made; this infant was breast-fed exclusively, yet had a well-marked Chvostek's sign and laryngospasm.

The average age of the children included in this study was 10 months; 3 of the infants were under 3 months of age; 29 had one or more convulsions; the majority of these 29 had had frequent convulsions; 40 had Chvostek's sign. In 22 cases the parents had noted the presence of a crow; in 6 cases breath holding attacks had been observed; 16 of the cases had carpopedal spasm and in one case there was carpal spasm alone. Trousseau's sign was noted in 9 cases.

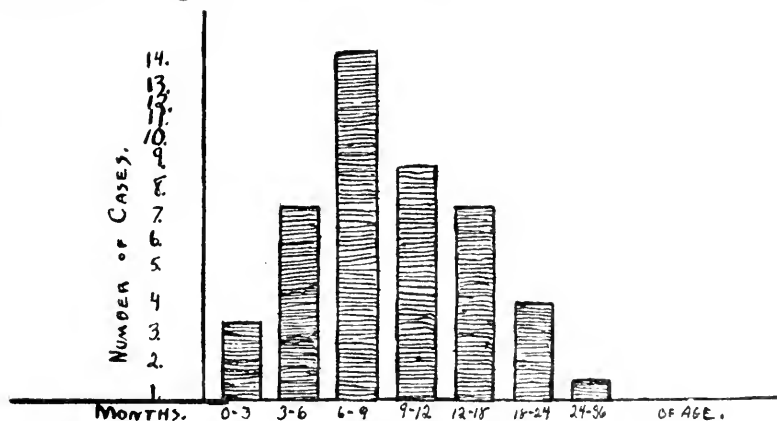


FIG. 2—Age Grouping of Forty-seven Cases.

Ten of the cases had been fed breast milk entirely; 8 had had breast milk supplemented with other food. This makes a total of 18 cases fed partially or exclusively on breast milk.

The prolonged feeding of condensed milk has a tendency to produce rickets. Only 6 cases of this study had been on a condensed milk diet; 7 of the children were having table food when first observed. In one of the patients, symptoms were first observed following an operation for removal of adenoids and tonsils; this has been frequently noted by other observers.

It is impossible to determine in a study of this limited scope whether prolonged living in a vitiated atmosphere is the impor-

tant etiological factor in the seasonal incidence of tetany of infants or whether it is the lack of sufficient sun light. The fact that tetany is rare in warm climates may not be due to the amount of sunlight which the infant receives as the fact that because of the warmth there is better ventilation of the houses. Above the arctic circle, in Sweden and Russia, there is no sunlight for 5 months of the year, yet I have not been able to find any reference in the literature relating to tetany in those regions.

In this brief study it has been noted that there was an increase in the number of cases of tetany seen in the dispensary of the Babies' Hospital in the spring of 1918. This followed a winter of unusual severity when the ventilation of dwelling houses was necessarily bad because of the cold and a shortage of fuel and that during the winter infants did not receive the normal amount of outdoor air.

17 East 71st Street.

MEGADUODENUM; HIRSCHSPRUNG'S DISEASE (Pennsylvania Medical Journal, Aug., 1919). W. L. Carr's patient, a girl, 6 years of age, had been constipated for five years and had vomited for twenty-four hours before he saw her. The child was in a condition of shock; the skin was pale, the lips and fingers were cyanosed and the eyes were staring. There was dyspnea with gasping respiration. The temperature was 97.5° F.; pulse, 120. The abdomen was greatly distended and there was a constant involuntary discharge of feces. The child died eleven hours after admission. Necropsy disclosed a marked distention of the intestines, which was particularly evident in the sigmoid colon, which was bent on itself. The wall of the upper part of the rectum and the lower part of the sigmoid colon was slightly calcified and the lining mucous membrane was very granular. There was hyperplasia of the mesenteric lymph nodes. A microscopic study of the tissue from this specimen showed a complete loss of mucous membrane, and in its place was a vascularized round cell proliferation of the submucosa. There was a corresponding hypertrophy of the inner and outer muscular coats.—*Journal A. M. A.*

TETANY.

REPORT OF AN UNUSUAL CASE*

By THEODORE J. ELTERICH, M.D.,

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By the term tetany is meant a spasmophilic condition, characterized by prolonged contractions of the muscles of the extremities and extreme irritability of the nervous system to mechanical and electrical stimulation. It is closely related to other spasmophilic conditions such as laryngismus stridulus and frequent eclamptic seizures. In fact, a latent form of tetany can usually be demonstrated in these diseases. Tetany also usually occurs more frequently during autumn, winter and early spring months and is rare in summer.

The underlying cause of tetany, occurring in young children, may be safely attributed to rickets and, in older children, to a neurotic condition. In both instances, absorption of toxins from the alimentary tract is probably the active cause. As in rickets, changes in the calcium metabolism occur in this disease—more calcium is eliminated than is ingested with the food. Calcium absorption depends to a great extent upon the amount of fat in the food. In the economy of the infant, one of the most important functions of the fat is to facilitate the absorption of the calcium salts from the intestinal tract. In rickets, there is not only a lack of deposition of these salts, but also absorption of those already deposited due to hyperemia, or as expressed by Virchow, a process closely akin to inflammation. This may to some extent explain the negative calcium balance observed in rickets and tetany.

In older children tetany occurs in individuals of a decided neurotic type. In all classes of cases that *marked and often serious gastrointestinal disturbances have either preceded or accompanied attacks of tetany* is the experience of the writer.

The relationship between the absence or disease of the parathyroids and tetany in children has not been proven. It has been shown that these alterations have occurred in children who have shown no evidence of tetany and the disease occurs in chil-

* Read before the Pittsburgh Academy of Medicine, October 28, 1919.

dren with perfect parathyroid glands. The following rather unusual case is of more than passing interest:

Bertha M. S., 4 years old, admitted to the Pediatric Service of the Allegheny General Hospital, August 29, 1918, with a previous diagnosis of meningitis. On admission, the general appearance of the patient was strongly suggestive of an advanced case of this disease. Physical examination, however, failed to corroborate the presence of a true meningeal condition. The reflexes were unimpaired and there was absence of Kernig and Brudzinski signs. Lumbar puncture was also negative. The temperature was 99° F., pulse 120, respirations 23, heart and lungs negative. The urine contained a slight trace of albumin, a few red and white blood cells. The patient was in a deep stupor and could be aroused only with difficulty. Urine and feces passed involuntarily.

The onset of her illness was somewhat sudden. About a week previous to her admission to the hospital, she complained of headache which was followed by a rather severe diarrhea. The bowel movements were frequent in number, very offensive, green in color and contained much mucus. She did not vomit. On the third day she became somnolent but could be aroused without difficulty.

Her previous history was good. She was of normal weight and height at birth, was breast-fed and partly raised on malted milk. She thrived and seemed not to have had any symptoms suggestive of rickets. She was shy and had a highly nervous disposition. With the exception of pneumonia, in her third year, she had escaped all contagious and infectious diseases. The family history as to tuberculosis, alcoholism or lues is negative.

On the day following her admission, she developed a tonic contraction of the muscles of the upper and lower extremities with occasional rigidity of the muscles of the back and of the face. The hands were flexed on the wrists and the feet were in the talipes equinus position. Any attempt to straighten the limbs caused severe pain and produced violent tremblings of the hands. The patient moaned constantly in her sleep and at times seemed to suffer severe pains.

This condition persisted for several weeks. During the fourth week she commenced to show signs of improvement and within a few days returned to full consciousness. Her general physical

condition improved very slowly, but she finally recovered fully.

During her entire illness, the temperature remained uniformly at about 99° F., with the exception of a flare up to 103° F. or 104° F. on 1 or 2 occasions, caused by the formation of several superficial abscesses in her right thigh. The pus contained staphylococci (albus).

The treatment consisted in the correction of the digestive disturbance by the usual methods, dietary and eliminative, and the administration of sedatives, bromid, chloral hydrate, codein and belladonna. The best results were obtained from the bromid and chloral. Tepid baths also afforded some relief.

The diagnosis is somewhat open to criticism. In tetany the muscles of the back and face are not usually involved nor does the patient lose consciousness. The condition was undoubtedly due to an intestinal toxemia and may be classified as an atypical form of tetany.

Escherich describes a somewhat similar condition which he calls pseudotetanus (Pfaundler and Schlossmann, Vol. IV, page 296). The clinical picture of this case corresponds to that of pseudotetanus, except that the arms and legs were affected, and very markedly so, which he states is absent in this condition. The nature of this disease has never been fully explained. Escherich called his cases tetany in spite of the absence of the characteristic over-excitability of the muscles, but Pfaundler, who made an exhaustive study of a new case, rejects Escherich's view for this very reason.

Pseudotetanus begins a few days after the onset of the disease and persists for from 3 to 6 weeks, when the contractures gradually relax.

The prognosis is good and the treatment consists in the administration of chloral and bromid or, if necessary, injections of morphine.

The diagnosis of tetany rests upon the presence of carpo-pedal spasm, Chvostek and Trousseau phenomena, and the over-excitability of the nerves to mechanical and electrical irritation. The peculiar position of the hands flexed on the wrists and the feet in the talipes equinus position, when once seen is a clinical picture not easily forgotten.

The Chvostek sign consists in tapping the facial muscles over

the exit of the facial nerve producing twitching of the muscles of the corresponding side of the face.

Trousseau's sign consists in the fact that pressure on the nerve trunks in the internal bicipital groove produces the peculiar tetanic position of the hand.

The prognosis in tetany is fairly good and the duration of an attack may vary from a few hours to several weeks. It must always be regarded as a grave condition. The treatment consists in correcting by proper diet the digestive disturbances which are invariably present, thorough cleansing of the alimentary tract, administration of sedatives and treating the underlying conditions which may be present.

As previously stated, rickets is the chief factor in the production of tetany, in children under 3 years of age. The administration of phosphorus and cod liver oil in these cases will usually prevent a recurrence of the attack.

In older children, the ever-present neurosis should be treated by proper régime, diet and tonics.

In conclusion, the writer is of the opinion that tetany is merely a symptom complex due to the absorption of toxins from the digestive tract, the underlying causes being rickets in the young and a neuropathic diathesis in the older children.

CARE OF NEW-BORN (Northwest Medicine, Aug., 1919). E. J. Huenekens has collected 70 cases of premature infants coming under his personal observation; of these 58 developed definite signs of rickets. Of the 12 who did not develop rickets, 3 were under observation too short a time and 4 were 2 to 3 weeks premature, leaving only 5 definitely premature infants that did not develop rickets. Therefore, 58 out of 63, or 92 per cent, of premature and twin infants were found definitely rachitic. The time of occurrence is of great interest, because rickets usually does not begin before the sixth month. Of 33 cases seen for the first time at or before four months, 27, or 81 per cent, showed evidence of rickets at that time. It is, therefore, evident that in the treatment of the special form of rickets in premature infants the deficiency of calcium must be made up. Based on the experimental work of Schloss, Huenekens has been using tricalcium phosphate and cod liver oil with very good results.—*Journal A. M. A.*

A MODEL PEDIATRIC SERVICE FOR THE MODERN GENERAL HOSPITAL

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In a recent issue of a journal devoted to the problems of his specialty, a colleague has discussed a model organization for a gynecological and obstetrical service, using as a model or point of departure service already existing in one of the best of our large general hospitals. This actual fabric of fact he has embroidered with colors supplied by a rich imagination, and has created what he considers an ideal service for his branch of surgery.

It has seemed to the present writer that something of a similar nature was called for in the realm of pediatrics, if this specialty is to be taken seriously, and given a dignified status in the cosmos of the twentieth century hospital. The usual tendency seems to be to tag a children's ward and a children's service to the tail end of the general medical, fill the ward with a general hodgepodge of surgical, medical, and orthopedic cases, which have nothing in common but a relative similarity of ages, and let each attending treat there all of his cases who happen to be under 12 years of age. Naturally, such a ward has, and can have no settled policy and no coherent plan, except such as is carried in the head of the actual pediatricist, and head of the ward, the head nurse. The chief of the children's service can of course order nothing for the patients of the other men who chance to be in the ward. Even though the general surgeon is quite willing, as a rule, to confess to a complete ignorance of the intricacies of infant feeding, he and the nurse must battle through the alimentation of the surgical children, until nature rallies to their aid and cures them, in spite of faulty feeding, or they become so frankly cases of malnutrition that he washes his hands of them, and turns them over in desperation to the pediatric service. This procedure will take perhaps a week, but more likely a month, too late for the best interests of the patients, and for the peace of mind of the man who has to try to regain the unnecessarily lost ground in feeding them.

Our feeling, then, is decidedly to the effect that all children in a hospital should rightly be in the Children's Service, which is organized under one head, a pediatricist. Whether or not he shall be considered, for administrative purposes, as under the medical chief (just as, for instance, in the hospital which we shall use as our text, the orthopedist and the otolaryngologist owe allegiance technically to the surgical chief), is a matter of minor importance. The main point is, that if a medically sick child or a well child is such a different being from an adult that he requires the trained services of an expert in order to properly nourish and guide him, still more is this expert knowledge and attention of right his, when surgical risks are superimposed upon medical, or when he is trembling on the verge of a tonsillectomy for which his general condition at the moment may be totally unfit. In our ideal service, then, all others treating children in the hospital should do so under the direction of the pediatricist; who then would not transfer his little patients to the surgeon, the orthopedist, or the nose and throat man, for their respective services, any more than he now transfers them to the radiologist or the pathologist, when he desires an x-ray or a blood culture. To paraphrase a remark made about the relationship that should exist between the physician and the surgeon in this regard, we might be permitted to ask that the other services act in this particular as the handmaidens of the pediatric. I remember a case in point recently seen, in which a baby with bronchopneumonia and erysipelas was having a sore over the sacrum dressed by the surgeons. A careful consideration of the case in the light of its whole picture, rather than as the work of 2 departments, brought out the fact that, in all probability, the offending organism causing all the trouble was a streptococcus which had entered via the sacral lesion.

If authority or reference be asked for, for this conception of the best organization for the ideal functioning of a children's ward, we may be pardoned for indulging in a personal allusion, and pointing to the plan of the Babies' Hospital in New York City as a model that may well be set before any children's ward. Perhaps no better effort could be made by any pediatric ward than to endeavor to approximate as closely as possible to this model. The hospitals that have done the best work, like the

armies that have consummated the greatest campaigns, have been those in which there was a centering of authority and responsibility in one head. The commission form of government, while admirable for a city democracy, is not an ideal solution of the problem of a hospital service.

In a discussion of this sort, it is perhaps as well, before going further, to postulate certain things as being granted by us all. If these are not taken as axioms, then the conclusions that we draw will not be binding. We shall assume, then, throughout this paper, that the mission of the modern hospital is threefold: first, comes the ministering to the sick within its doors; second, the instruction of the medical fraternity of the community, both within its staff and without—the hospital that fails in this second duty, of course, thereby confesses to its failure in the first, as we nowadays believe; third, the duty of educating the lay portion of the community in all matters pertaining to its health, individual or collective. All these functions we must bear in mind, in planning our pediatric service, if we are to secure the best results.

Let us enumerate the various positions that should be comprised in the ideal staff, and then go on to map out their duties and scope. We might name the following: a consulting pediatricist; an active attending, or pediatricist in chief; 2 associate pediatricists; 2 senior clinical assistants; and adjunct clinical assistants, to the number justified by the size of the clinic connected with the service.

Considering these functionaries in the order of their rank, we find first, the permanent consulting behind the permanent chief—permanent, that is, in the sense of having a continuous service. The consulting should be considered not in any sense as an emeritus, whose worth and usefulness are things of the past, but should be available, and constantly and freely used by the chief, for counsel as to the policy of the service, as well as for consultation over individual cases. From his riper experience, he should be a source of inspiration, as well as a rich mentor, for the teaching part of the work.

The permanent attending pediatricist, or chief, is the man on whose ability and personality the success or failure of the whole service depends. As the whole machine is dependent upon him, and he is answerable for its performance, he should of course initiate the nomination of his subordinates, who will be appointed

by and with the advice and consent of the board of trustees, managers, or governors, who, of course, hold the official appointing power. Their period of service should be co-terminous with their chief's.

In addition to the duties and privileges naturally inhering in such a position, the following special points ought to be mentioned. It goes without saying that a man who accepts an appointment to the headship of a service in this day and generation, will take his appointment not as a sort of Croix de Guerre, or benediction for work well done in the past; but rather as a commission, which invests him with the obligation to perform yeoman service in the future. Like the head of a large going business concern, he will keep in touch with every phase of his department, from the diet kitchen to the O. P. D. The part of his work which is, and of right ought to be, the most prominent in his mind, is the making of his daily rounds, on which as many of the associates and clinical assistants as possible should be not only invited, but expected, to be present. One of the first things necessary, in order to invest this function with its proper importance, is to set, and adhere to, a fixed hour. Without this, it is of course impossible to give the rest of the staff the ward privileges to which their work in the clinic entitles them. An attending, who is too busy to keep faithfully to this appointment, except in rare emergencies, is too busy to undertake the confining duties of the headship of an important department in a modern hospital. It has seemed advisable, in view of the teaching feature of our model service, without which we have agreed that our hospital is shirking one of its prime reasons for being, to have these rounds deal with but a selected number of cases on any one day, rather than to feel that every case should be seen by the chief on rounds every day. In this way, while it will not take many days for the complete circuit to be made, enough time may be devoted to each case considered to make the hour one of very real instruction to the practitioners on the staff who are taking time out of their busy days to attend, and who are justified in expecting the profit they obtain from these rounds to compensate them for much of the routine work that they devote to the clinic. The writer ventures to say that such rounds, as given at a hospital not a thousand miles from here, are well worth the time of any man in this city,

giving, as they do, to the half dozen men who attend them, a veritable post-graduate course in pediatrics, which greatly sweetens the necessarily wearisome grind that is inseparable from the maintenance of an outpatient department. The quizzing done by the chief, addressed in turn to each man present, regardless of age or rank, proves a most valuable and stimulating exercise. The 2, 3, or at most 4 cases seen during the hour are not too many to be read up by the men the same day; and it is surprising to find what a range of pediatric reading will be covered by such a daily stint. Guests should be welcomed; nothing keeps up the tone of this function like the feeling of being under outside observation.

Such rounds may well either begin or end at the dispensary, where there is always some material which may well be drawn upon to point a pediatric moral or adorn a children's tale. Such a daily visit to the clinic has several very good effects. It gives the patients a comforting sense of the importance placed by the hospital authorities upon this part of the work. It shows clinical assistants, nurses, and everyone else in the dispensary building that the hospital considers them, not as a body apart (which, unfortunately, is so often the case), but as a very real, vital part of the institution. It gives the chief an idea of the sort of attendance record the clinical assistants are making, and gives them, by the same token, some incentive toward a faithful attendance, when they see that this is seen and appreciated.

While we are speaking of rounds, we may logically take up 2 other matters which we have considered almost essential to the building up of the esprit that will make possible such a service as we have been considering. One is a weekly period, somewhat longer than the daily rounds, which has been humorously referred to as "Grand Rounds." At this time, there should be a formal medical taking of stock, when each case on the service, properly briefed and brought down to date by the clinical assistant charged with its conduct, is presented, and the events of the week gone over by the whole staff in the light of any new developments that have taken place. Assignment of special topics for preparation outside may be made at this time.

Some services have dignified some of the points mentioned in the last paragraph to the extent of forming a clinical society for their consideration. The very intimacy of the workers with each

other, and the possibility of verifying disputed points at the bedside, make such a society one of the most valuable that one can well imagine. This proves an excellent place to try out the reaction produced by any papers the members expect to present elsewhere.

The other matter, which may either be made a part of "Grand Rounds," or else grow out of it into a separate function, consists in the establishment of a weekly didactic clinic, such as was developed to a high degree in pre-war days in a hospital in this city, not connected with any teaching institution proper. To this were invited the members of the entire hospital staff (including the O. P. D.), as well as physicians throughout the city who had signified a desire to take advantage of the privilege. Such a demonstration clinic proves a wonderful stimulus to the men of the department that puts it on, making the working up of cases for this definite purpose a matter of vital interest.

There should be 2 associate attendings, on continuous service, but alternating as to their functions. Of these, one is in direct charge of the ward work; the other is chief of the clinic. The duties of the associate on the ward approximate those of the resident, in hospitals where there is such a functionary. His most important duties consist in: (a) acting as attending in the absence of his chief; and (b) seeing and treating daily all cases in the house, with the exception of those dealt with more exhaustively by the chief, on his didactic rounds. In addition to these functions (which, it will be seen, make his position on the staff one of great importance and responsibility, far greater than is ordinarily understood by the term "associate"), he should know, and should frequently be called upon to demonstrate, that he knows, intimately and at first hand, just what is going on in the diet kitchen. He should be familiar with the minutiae of the preparation of the infants' formulas, as well as with the varying daily content of the diets for the runabouts. Calories, as applied to hospital dietaries, should have for him none of the terrors of the unknown. He should synthesize and coordinate the work of the various specialists, and arrange the delicate formalities of calling in the handmaidens of the pediatricist,—orthopedist, surgeon, otolaryngologist, and, quite as freely and as frequently, the internist. He must be equipped with a knowledge of all the bothersome minutiae about which any blundering inquirer may

ask, and all about which the chief *should* know, but probably doesn't. He should act as a sort of ex-officio inspector-general, to use the military name of a certain unpopular but necessary functionary, whose business it is to know whatever is going on, and to report back to his chief, on needed changes. He should make it his business to drop into the ward at any and all times of the day, and, with or without the assistance of the interne, delve into things that will make the presentation of the cases by the chief more valuable.

The chief of the clinic, our other associate attending, should be, in addition to all that the name implies, a teacher of the clinical assistants. Not only is he held responsible for the actual attendance of a sufficient number of them to cover the cases, but he must so marshal his forces that the newer men are given the instruction so necessary to their advancement and so essential to the vital interests of the patients, and yet so seldom vouchsafed to the entering dispensary man. How well we know the usual formula used in introducing a new man into a dispensary room: "Go right ahead, Doctor, we have lots of material. Just go ahead and treat your cases as you see fit." The chief of the clinic should oversee the work of the new man for a time, and from time to time, so that it may conform to the policy of the service. It is most essential, for instance, that some uniform plan of procedure with regard to infant feeding be understood and employed throughout the clinic. He must so arrange the schedule of the men that the clinic is always at least partially manned, in case daily rounds are made during dispensary hours, as seems wisest, in order that a second trip to the hospital in one day may not be required of the clinical assistants, who are as a rule men in general practise. He should see to it that each man has an opportunity, as occasion may arise from time to time, to be excused from the routine work of the day, in order properly to work up a dispensary case for admission to the ward, or to do some special further outpatient treatment or test, such as lumbar puncture, protein sensitization test, etc. Without some such provision as this, it is quite impossible for the available diagnostic sources of a case to be exhausted before its admission to the hospital, and thus much valuable light may be lost, that might otherwise be brought to bear on the case. Without such opportunity to do something out of the ordinary occasionally, dispensary work quickly degen-

erates into an uninspiring routine, which soon loses its charm to the busy practitioner, and is endured by the serious minded, ambitious student of a specialty simply as an unavoidable stepping stone to the preferment that he hopes for, inside the house. The result of this belittling of the importance and interest of the dispensary is being seen these days in a situation strikingly like that so dreaded by the business man of yesterday, and only just beginning to be seriously combatted by the business man of today, namely, the unnecessary "turnover" of new employes constantly coming in to replace dissatisfied old ones who have lost interest in their job. This, of course, results in a constantly repeated training, never completed because the new men in turn drop out before they become really efficient. In the very nature of things, not more than 2 or 3 clinical assistants can reasonably aspire to places on the attending staff; but every one of them can demand, and should receive, an invaluable postgraduate course in his specialty, and those allied to it, if only some such enlightened policy is put in force and carried out. The reflex effect of such a policy upon the ward service, both as to the character of its conduct and the cases sent in, is wonderfully stimulating. And so the post of chief of clinic has proved to be one of the most important, as well as fascinating and exacting, on the whole staff, in hospitals where the dispensary has at last come into its own.

At last, after skirting all round them throughout this discussion, we come to a consideration of the foundation stones of our edifice, the clinical assistants, whom, as Lincoln once said of the common people, the Lord must love, for he made so many of them. They fall into 3 classes: (1) the man who plans to do pediatric work exclusively, in time if not right away, and so aspires to a place on the hospital staff; (2) the general practitioner who wants to be able to say that he is connected with such and such an institution, and perhaps have the privilege of using its private rooms for his patients; (3) the physician, young or old, who genuinely desires instruction, and who, if the scheme outlined herein, or some other with a similar purpose, is adopted, will get it. For it goes without saying, that the most valuable thing about a clinical assistantship is the instruction gained—valuable, that is, from the point of the patient treated as well as from that of the doctor. Not only is it a fact that that is virtually the only coin with which his services can be paid, but it is equally

a fact that, if there be any virtue or if there be any praise in special departments and special rooms, the mere appointing of a man to a dispensary service does not, *ipso facto*, invest him with the necessary knowledge and experience successfully to perform his duties. It should, therefore, be evident that that hospital is failing in its duties, in both directions, which does not educate its clinical assistants to the best of its ability (which means in the wards as well as in the dispensary) in the discharge of their duties, in other words, in pediatrics.

If some such privileges are extended, certain requirements may fairly be demanded. A reasonably faithful attendance is, of course, taken for granted; the popularity of such a service, as soon as its advantages become at all widely realized, will produce this almost automatically. Each man should be required to read or publish something, as from the service, at least 3 times a year. A report of a case is surely not such a difficult matter that it could not be accomplished by any man as often as this. A piece of real research work, alone or in partnership with some one else, ought to be done once a year by every man on the staff; a yearbook by one hospital department would be an innovation, but surely not an impossibility! Attendance at rounds is, of course, a privilege, providing rounds are made as interesting as we have a right to demand that they should be made.

I venture to predict that some such plan as the one we have mapped out will have to be adopted sooner or later, if we are to solve the vexing problem of keeping our dispensaries efficiently staffed. The hospital, whose clinical assistants are thus given a continuous postgraduate course in their specialty, inside the hospital and out, and are taught to present the results of the work that they have done and the studies that they have accomplished, will soon cease having to beg men to serve its rooms. Instead, it will have to establish (*mirabile dictu*, can one imagine it?) a dispensary staff waiting list.

A logical way to bring this paper to a close would be to discuss the dispensary in which so many of the activities referred to above are to be carried on. But this, though perhaps the crux of the whole situation, must be taken up in a separate paper; space forbids considering it here. Suffice it to say that a large, enthusiastic, faithful dispensary staff always means a wealth of patients, who soon flock to the place where they get the best treatment.

The effect of this on the ward, if only there is the teamwork that we have tried to develop, is self evident. Only with such a close, organic connection between inpatient and outpatient departments can the true hospital service of highest efficiency ever be reached. The hospital service that fulfills our 3 postulates and best serves the patient, educates the physician, and teaches the laity, to the fullest extent of the possibilities that in it lie.

TOXIC ACTION FROM INTESTINAL FLORA (Riforma Médica, Naples, Aug. 16, 1919). N. Pane is director of the Istituto di Batteriologia of the University of Naples, and he here presents comprehensive data confirming the presence in the intestines of toxic facultative anaerobic and aerobic bacteria which by their products may gradually in time thoroughly intoxicate the organism. This is especially liable when much meat is eaten. By modifying the diet, conditions may be so changed that the toxic bacteria no longer find the environment favorable for their proliferation, and the production of their toxic products ceases. This is the explanation, he continues, of the benefit from restriction to milk in chronic intestinal and liver disease. The milk in the diet favors the proliferation of the bacteria of acid fermentation, and these crowd out the toxic bacteria. Milk in itself does not seem to have any antitoxic action. He cultivated in milk some of the toxic bacteria and their virulence seemed to be permanently increased. All his patients were between 50 and 60 and all had indican in the urine. He does not place any reliance on yoghurt as, although this answers the purpose while the yoghurt is being taken, yet as the lactic acid bacilli do not form part of the customary flora of the adult intestine, they soon die out when the yoghurt is discontinued. The acidophilus and the bifidus, on the other hand, are encountered regularly in human stools.—*Jour. A. M. A.*

SOCIETY REPORT

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS.

Stated Meeting, Held January 8, 1920.

CHARLES HENDEE SMITH, M.D., *in the Chair.*

A CASE OF COMPLETE HEART BLOCK.

DR. WILLIAM ROSENSEN presented this patient, a girl ten years of age, who first came under observation at the cardiac clinic of the Mount Sinai Hospital 2 years ago. At that time she had a pulse of 44, but was perfectly comfortable, her only complaint being slight pain and distress over the precordium on considerable exertion.

Her family history had no bearing on the condition with the exception of the fact that she had a sister who had mitral regurgitation.

The patient's personal history showed that labor had occurred at full term, was tedious and difficult, and she had been blue for several hours after birth. She had had pneumonia, diphtheria and whooping cough, but no chorea, acute rheumatism, or pains in the joints. Until she was seven years of age she showed absolutely no symptoms of heart trouble. At this time the pain and distress over the precordium was first noticed, but there were never any signs or symptoms of decompensation.

Physical examination revealed a definite apical impulse in the fifth interspace somewhat outside the midclavicular line. Percussion showed the right border of the heart 5 cm. to the right, and the apex $9\frac{1}{2}$ cm. to the left of the midsternal line. There was a long sawing diastolic murmur transmitted over the precordium, best heard in the second left interspace. The pulse was always between 40 and 50. The electrocardiograph showed a complete heart block. The heart was enlarged both to the right and to the left. The heart function, however, was quite normal.

There was absolutely no cyanosis, but slight dyspnea after hopping 150 times. The blood count and urine were normal. The fluoroscopic examination showed a typical condition which the roentgenologist stated was characteristic of heart block.

There was a coincident contraction of the right and left sides of the heart. He thought the murmur was congenital on account of its character and the history of the case. The defect, though impossible to localize definitely, seemed to be a direct communication between the aorta and pulmonary artery, just above the aortic valves.

Dr. Rosenson said he had been able to find only 6 cases of congenital and 20 cases in all of heart block in childhood described in the literature. Some of the reported cases were due to diphtheria and rheumatism.

A CASE OF AURICULAR FIBRILLATION IN A YOUNG GIRL.

DR. WILLIAM ROSENSEN presented this patient, a girl 15 years of age, who gave a history of having had pneumonia twice and frequent attacks of tonsillitis. She gave no history of rheumatic pains or joint involvement. Seven years ago she was in the wards of Mount Sinai Hospital 3 times within 1 year suffering from symptoms of decompensation, dyspnea and palpitation. During the last 5 years she had attended school regularly and was comfortable all the time, never having been compelled to take to her bed.

About 1 month ago she had slight pain over the precordium and considerable dyspnea in walking up stairs and passing into the different class rooms at school. She had an absolutely irregular pulse, the rate being 120. A definite impulse could be seen in the midclavicular line. On auscultation, a blowing systolic murmur at the apex could be detected. About 7 years ago a note was made on her history sheet at the hospital stating that she had a presystolic murmur. She was in bed for 10 days on large doses of the infusion of digitalis, 2 drams every 4 hours. She has had an irregular pulse only during the past month. There was evidence that she had had heart disease for 10 years. The electrocardiograph showed auricular fibrillation and the X-ray showed the heart to be enlarged.

SPECIMEN OF CONGENITAL HEART MALFORMATION.

DR. WALTER LESTER CARR presented this specimen. He stated that the boy from whom it was taken was 12 years of age, underdeveloped and poorly nourished, and both skin and mucous membranes were markedly cyanosed. The fingers and toes were clubbed with capillary pulsation. Venous pulsation was seen on

both sides of the neck. The chest was not rachitic, but there was a flare in the costal cartilages from the 7th to the 10th ribs on both sides. The heart showed a diffuse heaving without a distinct apex area. Palpation gave a thrill over the entire precordium. Auscultation revealed an intense systolic murmur with the first sound, heard with great intensity at the second left interspace and with diminished intensity in the back. The difficulty was to determine the relationship of the murmurs, but finally the diagnosis was made that there was a patent foramen and an obstructed pulmonic valve. The heart was hypertrophied. Changes were detected in the lungs. This was confirmed by the X-ray, which showed the heart enlarged and the lungs infiltrated. The child had no edema and the urine was negative. The temperature was irregular owing to the lung condition. The blood showed an increase in the red cells to 6,900,000. The child was allowed around the ward but gradually grew worse, the tuberculous process in the lung increased, until he had to be kept in bed and finally died on November 30, 1919. In showing a specimen of congenital heart malformation it was well to appreciate that there might be a defect in development that gave congenital heart disease or there might be heart disease, as endocarditis, developing in intrauterine life. This specimen belonged to the type of defective development. Clinically one had to consider (1) the character of the lesion, (2) the prognosis, and (3) the likelihood of intercurrent disease. First, as to the character of the lesion, when a patent foramen or an obstructed pulmonary artery might usually be detected without difficulty, but in the malformation shown a decision as to the complete lesion was difficult. Second, the prognosis was always bad, as the child could not develop and grow since the heart was not able to carry on the circulation. Third, pulmonary tuberculosis was likely to occur.

Drs. Cornwall and Weiss had performed the autopsy under the direction of Dr. Larkin of Streckler Memorial Laboratory. The report showed that the heart was considerably enlarged. The myocardium was beef red in color and presented no evidence of interstitial fibrosis. The valvular arrangements in the heart were of a very peculiar nature. The pulmonic orifice was considerably narrowed. The semilunar cusps of the valve were misplaced, being about an inch and a quarter above their normal level. There were several redundant folds of intimal endothelium

between the conus arteriosus of the right ventricle and the true semilunar valves of the pulmonic. These intimal folds were arranged in the form of pseudo valves. The left ventricle was considerably widened and into it showed 3 sets of valves, those from the right heart, namely, the tricuspid, and those from the left heart, namely, the mitral and the aortic valve. The mitral valve was posterior to the tricuspid and somewhat to the left. This arrangement was made possible by the absence of a portion of the intraventricular septum. The foramen ovale was widely open. The aorta presented no anomalies. The ductus Botalli was patent half way across. A probe could be passed only one-half way across from the aorta to the pulmonic artery, but not straight through. The conditions in the heart were pulmonary stenosis; patent foramen ovale; patent intraventricular septum; eccentric hypertrophy of the left heart, and slight concentric hypertrophy of the right heart. The circulation then would permit of a three-fold distribution of the right auricular blood, namely: most of it would enter the left ventricle, and lesser amounts would enter the right ventricle and left auricle. The absence of a marked hypertrophy of the right ventricle in the face of pulmonic obstruction was to be explained, it seemed, on the basis of a great percentage of the blood passing in 2 directions in addition to the normal. Incidentally it might be noted that this might account in no small measure for the intense cyanosis observed during life. In addition to the heart defects, the autopsy revealed a diffuse miliary tuberculosis and amyloidosis of the liver, spleen and kidneys.

Discussion—DR. WILLIAM I. REARDON said there was really nothing to be added to what Dr. Carr had said. In connection with the left ventricle, there were 3 valves, the tricuspid, aortic and mitral, while with the right ventricle there was only one, the pulmonic valve, which was markedly stenosed. There were 2 patent areas in the interventricular septum. The circulatory feature of interest was that the right ventricle received its blood for the pulmonary circulation by an overflow from the left ventricle through the patencies in the septum. There was an abortive attempt at a patent ductus arteriosus Botalli, a small sac-like depression being present in the pulmonary artery and also in the

aorta, but a probe could not be passed through connecting these up. The foramen ovale showed a small patency.

SINUS ARRHYTHMIA.

DR. MURRAY H. BASS read this paper, in which he stated that the development of the electrocardiograph had opened up a vast field for exploration of both normal and pathological conditions of the heart, and by means of this information they were able to group the various cardiac irregularities in a much more scientific manner than formerly, and had brought out the fact that cardiac arrhythmias were really not as rare as had previously been supposed. In this paper he briefly reviewed the various types of arrhythmia which were met with in childhood, laying special stress on the prognosis connected with each variety. These types were: 1. Sinus arrhythmia. 2. Simple tachycardia. 3. Paroxysmal tachycardia. 4. Auricular fibrillation. 5. Heart block. 6. Premature beats.

Sinus arrhythmia was by far the commonest form of juvenile irregularity. This condition rose from changes in the vagus impulse which resulted in the heart, as a whole, beating at different rates at different times. Very marked varieties of sinus arrhythmia might perhaps be considered as bordering on the pathological, but this type of irregularity was found in practically all children so that it was spoken of as a physiological irregularity. It was very important to bear this fact in mind since many parents had been unduly alarmed by being told that their children were suffering from heart disease when in reality the condition present was only sinus arrhythmia. In diagnosing this condition the child should be asked to take deep breaths, when the irregularity at the pulse would be brought out more clearly. Following this, the child should be asked to take some rapid exercise, when the irregularity, if due to sinus arrhythmia, would diminish or entirely disappear. As a final test, though this was rarely necessary, atropine might be administered, following which the irregularity would disappear owing to the blocking of the vagus impulses. This condition needed no treatment per se, though when present in high-strung neurotic children it should be regarded as one of the evidences of nervousness, and the appropriate treatment of the condition instituted. Under no circumstances should exercise be forbidden on account of the heart irregularity alone.

Under the head of simple tachycardia were included all those cases of rapid heart in which the pulse tracings or electrocardiogram revealed no abnormality of the heart mechanism except increased frequency of the beat. These cases differed from paroxysmal tachycardia in that the electrocardiogram showed the impulse in the heart to rise at its normal site of origin, whereas in paroxysmal tachycardia the impulse arose elsewhere. Simple tachycardia might result from nervousness, hyperthyroidism, or from conditions in the heart muscle itself making increased demands on the circulation. It was associated with fever and certain disturbances of nutrition, such as scurvy. In rare instances tetany might be the cause of tachycardia.

Paroxysmal tachycardia was a condition characterized by sudden attacks of very rapid heart action in which the electrocardiogram showed that the impulse during the attack failed to arise in the sinus node, but originated in some other portion of the heart tissue. The cause of these attacks was not at all clear. Some of the cases occurred in previously healthy children; others were found in children suffering from rheumatic carditis or diphtheritic myocarditis. Contrary to the condition in adults, the great majority of cases in children occurred in individuals free from valvular disease. It might occur at any age, the youngest reported case being 28 months old. The attack started very suddenly accompanied by an abnormal sensation in the heart region, occasionally by vomiting and depression. It was quite remarkable to see how comparatively comfortable these children were even when the pulse rate lay between 200 and 300. In addition to the rapid pulse there was excessively rapid pulsation at the wrist. The duration of an attack might vary from a few hours to several weeks. Not enough cases of tachysystole had been carefully observed to permit one to speak with any degree of positiveness as to the prognosis. If the attacks did not occur with great frequency and if the heart muscle did not seem much affected, the outlook as to life was apparently good, since many of the cases were reported in adults who had survived, though their attacks began in childhood.

Auricular fibrillation was infrequent in childhood and its characteristics when present in early life did not differ in any way from those found in adults. The reason it was rare in

childhood was because it almost never occurred in a heart previously healthy.

Heart block in children, contrary to the condition in adults, was due to the acute, rather than to the chronic, cardiac diseases. Whereas the common causes in adults were syphilis and arteriosclerosis, in children acute rheumatism, diphtheria and less often pneumonia were the chief etiological factors, though it might less commonly be due to congenital malformation. Too few examples of heart block had been examined and followed up for one to be able to say much in regard to their prognosis. They undoubtedly must be looked upon as very serious cases, and, especially when accompanied by defective cardiac development, should call for a very guarded prognosis.

Premature beats were not a very frequent finding in childhood. While in adults they were of no very harmful portent, in childhood they were often an indication of severe damage to the heart muscle. There was considerable difference of opinion as to the prognostic significance of extrasystoles. Personally, he could truthfully say that he had never observed extrasystoles in children except in cases in which he could put his finger on a real cause for serious heart damage. Thus he had seen them in the course of diphtheria and had seen them persist for several years after an acute illness.

In summing up, Dr. Bass said the fact should be emphasized that, contrary to the views entertained 5 or 10 years ago, the cardiac arrhythmias were not confined to adult life. Moreover, practically all the various forms of irregularity were represented in early life. It was also of considerable interest to note that the same clinical conditions might have an entirely different etiology in childhood and in adult life. On the other hand, he did not wish to convey the idea that arrhythmias were commonly encountered during childhood; he believed, however, that they were of frequent enough occurrence to be of considerable clinical importance. Now that most of the larger hospitals were equipped with electrocardiographs, he thought that pediatricians should make an effort to examine all cases of cardiac arrhythmia cardiographically in order that their knowledge of this relatively new and unexplored field might be rapidly increased.

Discussion—DR. LOUIS FAUGERES BISHOP spoke of the prognosis in congenital heart block. He said he had had the privi-

lege of following one of these examples of heart trouble for quite a number of years. The patient was a young woman who came to him about 10 years ago from Washington. She had had a very slow heart from birth, and, her father being an army surgeon, she had been kept under quite close observation. At one time her condition underwent a sudden deterioration and for that reason she had consulted him. At that time she had a heart rate of about 40. The Mackenzie polygraph (since they did not have the electrocardiograph at that time) showed evidence of auricular flutter superimposed on the congenital heart block and that explained why she was not in as good physical condition as ordinarily. The auricular flutter subsided and she regained her normal health. About 3 or 4 years ago she consulted him again, this time to know whether she should get married. Knowing that having decided to get married remonstrance would be useless, he gave his consent. She had since gone through a confinement safely and was enjoying a fair degree of health. Though she had had this heart block from birth, so far as he could see she was getting on well and was a happy mother.

DR. HERMAN SCHWARZ stated that he had followed up the cases of 3 children who had presented extrasystoles. One was a child 4 years old, whom he only saw for a few months. The second child was 9 years old when Dr. Schwarz first saw him 4 years ago. The third was 7 years old 2 years ago. The second case had these extrasystoles fairly constantly until a month ago. There had never been any acute disease, and there was no etiological factor obtainable. These cases were not sick and did not show any signs of cardiac distress. It would seem that extrasystoles associated with other heart lesions might mean a diseased ventricular wall. Perhaps that was also the case where there are no other lesions. However, the same care should be taken at the start in these cases as if they were cases of straightforward valvular disease of the heart.

DR. WALTER LESTER CARR said he wished to speak of tachycardia. Recently he had seen a nervous boy who was away at boarding school and often took more than ordinary exercise. He had examined the boy several times and concluded that the tachycardia was a nervous manifestation. During the Christmas holidays the boy was examined by 3 physicians, one of

whom thought it was wrong to allow the boy to take exercise. An X-ray showed the heart of normal outline, and after exercise the heart rate was regular and steady. An irregular, rapid heart during the time of development and growth was not at all unusual. It was unfortunate that terms were used that gave the impression that these heart conditions were organic. Physicians were responsible for insisting that rapid and irregular hearts should be cared for as serious lesions, whereas regulated exercise lessened the rapidity and irregular action. With reference to the rapid action of the heart seen in some children and babies, he had such cases with acidosis. One baby was a year old and had a pulse rate of 190 and a decided acidosis, without organic changes.

DR. WILLIAM ROSENSON said he did not think it was possible to say anything definite in regard to the prognosis of extrasystole. In some cases of extrasystole there was serious damage to the heart, while in others there were neither symptoms nor signs of cardiac disease. In two such cases coming under his observation there were no signs or symptoms of heart disease and the extrasystoles disappeared from time to time; then again they would appear. The cardiac function was good and sometimes the systolic murmur was heard only over the pulmonary area. In neither case could he say anything in reference to prognosis from the extrasystole alone.

DR. DEVER S. BYARD said he would like to acknowledge his appreciation of Dr. Bass' paper, and his interest in the open discussion which it had provoked. His own impression was, generally speaking, that extrasystole did not necessarily express a serious cardiac condition, although he could not assume to have noted it very frequently in children.

He recalls recently extrasystole in 2 brothers in immediate convalescence from severe measles. One boy was really very ill, his measles being complicated by double otitis media and acute endocarditis. He showed extrasystoles on the 12th day following the appearance of the rash. The younger boy had also a severe type of measles with no apparent complication. On the 10th day following the appearance of his rash, he, too, showed the extrasystole. The symptom in the case having endocarditis persisted nearly 4 weeks, but disappeared in the

second case after 3 weeks. Both subjects had some circulatory embarrassment in the first week. This sign was noted. Electrocardiograms gave no other evidence of cardiac disease. In the one child evidences of the endocarditis persisted nearly 3 months. In the other, after the first week, the extrasystole was the only noted abnormality. Both boys are now absolutely free from evidence of cardiac disease.

These probably instance cases presenting extrasystole in toxemias, in some of which, at least, the symptom need not be regarded as particularly unfavorable.

DR. ROBERT H. HALSEY called attention to several outstanding facts in the history of the introduction and use of medical instruments. First, the introduction of the clinical thermometer brought out a good deal in reference to the occurrence of temperature which had not been thought of before; but most important, temperature was only a symptom, especially in infectious diseases. When the sphygmomanometer was introduced, trouble began in the effort to understand what high or low blood pressure meant. Even now many fail to realize that it is only a symptom. So, too, with the introduction of the electrocardiograph, there are a number of things which are not yet fully understood, and one of these is the extrasystole. One interpretation is that the extrasystole indicates an irritable state of the heart muscle and depends upon a condition which may be temporary or progressive and permanent. Other signs must be considered with the extrasystole, and thus together they may indicate slight or serious changes taking place.

DR. L. T. LE WARD said that during a discussion before the Section on Medicine a few months ago, the X-ray was referred to as one of the "older methods," like auscultation, so perhaps he was a little out of date in speaking of the X-ray, though the X-ray was only 25 years old. However, though the electrocardiograph had come largely into use in the diagnosis of heart conditions, the X-ray evidence was still of extreme value. He had known such a gross lesion as dextrocardia missed by electrocardiograph examination in the absence of X-ray examination. He wished therefore to enter a plea in regard to the interpretation given as to the size of the heart, since a slight alteration in the position of the patient might materially alter the diameters of the heart. He had seen such gross errors with plates taken

on the back of the patient, and in children who were ill that was apt to be the case, as it was easier to take the plate that way. Unless one realized the possibility of gross deformities in the shape of the heart when the plate was taken on the back one might be led into error. It was a difficult problem to establish a standard for the normal size of the heart at different ages and particularly was that true in children. The effect of the respiratory phase on the size of the heart was very marked and the difference between a plate taken in the upright and one taken in the prone position was 10 or 15 per cent. There was also difficulty at times in distinguishing between right and left side enlargements. To obviate the possibility of error, due to these different positions, one should put markers on the front and back of the chest to make sure that there was no rotation at the time of the exposure. Another very important point, especially applicable to difficult cases in which one was trying to discover minute changes, was the advisability of making a series of shadows at long distance and then averaging the results. The civil engineer employed this method of taking averages when he was endeavoring to make accurate calculations, and it was certainly wise to use such a method in our work.

DR. CHARLES HENDEE SMITH said he was interested in the remark that mothers ought to be taught not to worry about these irregular hearts and also felt that too few doctors realized that these irregularities were not of serious significance. Nurses are perhaps in greatest need of education on this subject. He said that if a child had an irregular heart and one left stimulants about, the nurse was sure to give them. He cited a case of that kind in which a child with pneumonia had perhaps been given a little too much digitalis and the pulse slowed down. During convalescence the child was in perfectly good condition with a physiological sinus arrhythmia, but the nurse, not understanding this, had given all the caffeine and camphor that was available.

Premature systoles in his experience were very rare; he remembered having seen only 3 or 4 cases of premature systole. He recalled one child, otherwise normal, who from time to time came with fairly frequent premature systoles. The other cases that he had seen had a moderately severe heart lesion and had all done perfectly well. It certainly is a rather rare condition in

children whose hearts were found damaged and decompensated. He was surprised to hear that Dr. Bass had found it to be considered more serious in children than in adults.

DR. BASS, in closing, said he was glad his paper had provoked some discussion about extrasystole, because in looking up the subject in the literature he had found so many different opinions expressed. He had not seen a great many cases and those that he had seen seemed to be following serious conditions. In 2 cases, in which extrasystole had followed diphtheria, it had persisted, but the children did not seem sick, though their hearts were damaged in some way.

The statement about extrasystole being more serious in children than in adults Dr. Bass said was quoted, the statement having been made by Dr. Wilson in an article in the *American Journal of Diseases of Children*, published 2 or 3 years ago. From the standpoint Dr. Halsey had taken he must be correct. These cases should be kept under observation and reported on from time to time. Dr. Bass said he had gone through the literature and the statements made in regard to extrasystole were very vague and misleading.

Dr. Rosenson's child was 10 years old and did not look more than 6 and was 20 pounds below the average in weight. The boy of 15, whose case he had reported, was the size of a child 11 years old. Most of these cases were reported as cases of patent ventricular septum and he had thought that his case might be explained on that basis. The condition under the X-ray was of considerable interest. Cases of patent ventricular septum when examined by means of the fluoroscope showed the heart shadow to be circular in outline. The contractions of both the right and left heart borders occurred synchronously, so that the shadow appeared suddenly to diminish in size with each systole. This was probably explained by the fact that there was some rotation of the heart, resulting in the right border being formed by the right ventricle (instead of the auricle) and the left border of the left ventricle.

DR. SMITH asked whether in paroxysmal tachycardia anybody had tried vagus pressure. He said he had seen one elderly person and one adult in whom, by pressing on the transverse process of the cervical vertebra, one could control the paroxysmal tachycardia.

DR. HERMAN SCHWARZ said in reply to Dr. Smith's question regarding the control of paroxysmal tachycardia by pressure on the vagus that Dr. Koplik had observed such a case for many months in the wards of Mt. Sinai, and that pressure on the vagus did not cause any change in the rhythm.

FLUID INJECTIONS IN DEHYDRATED INFANTS.

DR. STAFFORD MCLEAN described experiments made during the summer of 1918 for the purpose of securing some exact data on the effects of the introduction of fluids in dehydrated infants. After a series of experiments in rabbits, using 4 and 6 per cent. sodium bicarbonate injections intraperitoneally, and also injections of 6 per cent. dextrose, they decided that similar injections could be given to infants without causing either injury or discomfort. A special chart was kept in each ward where the fluids were administered, and in conjunction with the ordinary ward records data relating to the immediate effects of fluids injected were also recorded; these included weight taken before injection and 24 hours later, and records of pulse, temperature and respiration $\frac{1}{2}$ hour before and 1 hour after treatment. Only infants showing signs of dehydration were treated. There were 76 infants who received in all 269 injections of fluid. Of these injections 155 were hypodermoclyses, 92 were intraperitoneal injections and 22 were sinus injections. The mortality in these 76 cases was 56.5 per cent. The amount of the clyses varied between 90 and 150 c.c., depending upon the size and condition of the child. The following different solutions were used: 6 per cent dextrose in normal saline, 6 per cent dextrose in distilled water, normal saline solution, 2 per cent sodium bicarbonate with 2 per cent dextrose solution and 1 per cent dextrose with 1 per cent sodium bicarbonate. No bad results had been noted from the intraperitoneal injections except discomfort in a few instances. An analysis of the 76 cases showed that there were 26 cases of acute intestinal intoxication, or 34.2 per cent; of all other diseases there were 50 cases. The mortality in the intestinal intoxication cases was 76.9 per cent as contrasted with 52 per cent in the other diseases. In going over the record they had been impressed by the bad results in those infants who received 3 or more injections as compared with those who received less than 3. In spite of these results noted in the table

it was found that repeated injections did no harm. One of the cases received as many as 13 injections. After going into a detailed analysis of the effects of these injections on weight, temperature, respiration in the different groups of children in the series and studying the effects in infants at different ages, Dr. McLean summarized the results as follows: Injection of fluid into the peritoneal cavity in dehydrated infants is a simple method of procedure and in our hands has had no undesirable effects. The size of the infant is no bar to his ability to utilize the fluids injected. From the results of injections in very small infants, under 3,000 grams, we are led to believe that larger infants might utilize larger amounts than have been given the infants in this study. Age has no bearing on an infant's ability to *utilize* injected fluids. The pulse is more frequently affected after sinus and intraperitoneal injections than after hypodermoclyses. The respiratory rate is more frequently affected in peritoneal injections than in sinus and hypodermoclyses. The temperature is more frequently elevated in sinus injections than in intraperitoneal or hypodermoclyses. Weight gains were more frequently noted following intraperitoneal injections than after sinus injections or clyses. Certain infants do not show any improvement until they have had repeated injections of fluid. The shorter the interval between the onset of symptoms and the beginning of treatment the greater is the response.

Discussion.—DR. HERMAN SCHWARZ said this was a very interesting and important contribution to the study of water balance in infants and children. This question was gaining more and more importance, and rightly so. Through an understanding of the water balance the increased infant mortality might be explained and also the occurrence of acidosis in gastrointestinal and other diseases. It was also important in regard to the fever itself. In the new-born infants, fever had been thought to be due to lack of food, but the late Dr. Crandall showed that it was due to lack of water and not lack of food. Other experiments have been conducted for the purpose of observing and studying the water balance. Meyer took 3 groups of children and gave them a protein milk of high concentration, containing about 1200 calories per liter. The water intake was very much reduced. The first group lost weight; the second group held its weight, and the third group gained for a little while. The first

group, that which lost weight, also regularly showed a rising temperature. This fever could be made to disappear by giving the children water, and they could also be made to gain merely by the addition of water. The nitrogen balance was positive, but the sodium chloride balance was negative. J. O. Balcar's experiments (*Archives of Internal Medicine*, Volume 24, No. 1, p. 116) also showed that if animals were given large doses of sugar, temperature could be produced, but if large doses of water were given in addition, the temperature could be brought down. We know that many children have increased temperature during the summer, without anything accountable for it. These temperatures may go up as high as 101° and 101.5° F. and can be made to disappear by absolutely no other procedure than the giving of fluid. The amount of fluid excreted by a child in hot weather is about 6 times as much as in cool weather. In sick infants, especially those with gastrointestinal conditions, acidosis and the like, it is important above everything else to see that the water balance is covered with a normal or even more than normal amount of water, apart from the amount of calories ingested.

DR. SMITH said that those who attended the joint meeting of the Pediatric Societies in Philadelphia would remember that at the Children's Hospital they gave fluid by mouth in the long intervals between feeding and they had been trying it at Bellevue. The fluid was administered by using a catheter and a funnel and was given during the long interval between feedings at night. By this method one could give a good many ounces of fluid in 24 hours. It was interesting that in the case of 1 or 2 children who were being fed on thick gruel, because they did not retain liquid food, the water administered in this way stayed down better at night. Giving water by gavage had the advantage that it did not require sterilization of water and apparatus as it did in the other complicated methods of administration. A child would often retain water given by gavage when it could not retain it if it was given with the food.

DR. HAROLD R. MIXSELL called attention to one point not emphasized. He said that at the Nursery and Child's Hospital they had combined 2 methods of giving fluids: giving normal saline by the intraperitoneal route, and using 10 per cent glucose solution intravenously. Although he had not the exact figures at hand, he was under the impression that their mortality at the

Nursery and Child's Hospital in cases of extreme dehydration had been decreased to at least 10 per cent lower than Dr. McLean's figures. At any event, the results had been most gratifying and he felt that it should be mentioned. Dr. Marriott of St. Louis had suggested it, and had reported equally good results.

DR. L. T. LE WALD said that in connection with the new method of X-ray examinations after injecting oxygen into the peritoneal cavity for diagnostic purposes certain points in the technic had been brought up because of the possibility of untoward consequences. Dr. McLean had used such a large series of children, injecting fluid into the peritoneal cavity, that his experiments were very valuable as showing that this procedure was devoid of danger. Owing to the fact that the injection of air into the peritoneal cavity was of such great diagnostic value a contribution that went to show that the procedure was devoid of danger was most welcome.

DR. MCLEAN in closing said that in the study just reported he had been careful to avoid conclusions.

In reply to Dr. Mixsell, Dr. McLean said that he knew the method of Dr. Marriott, but that it had not been done at the Babies' Hospital in connection with this work.

Dr. Le Wald had asked if the technic was not difficult and were one not likely to puncture the intestines. In reply Dr. McLean stated that it was an extremely difficult matter to puncture the intestine when one desired to do so. He said that he had had no accidents. In a couple of Dr. Blackfan's cases, where this method had been used, just prior to the infants' death, a small hemorrhagic area had been found about the site of the puncture and in other cases under the same conditions some fluid had been found in the peritoneal cavity. Although this method was used successfully in a number of cases by Blackfan, he had stated in his article that Dr. Howland had brought the method back from London, where he had seen it used in one of the hospitals.

DEPARTMENT OF ABSTRACTS

CAUTLEY, EDMUND: DUODENAL STENOSIS. (British Journal of Children's Diseases, April-June, 1919, p. 65.)

Edmund Cautley reports a case of duodenal stenosis, where the child lived for over 13 months, although the degree of stenosis was so great that it would only admit the passage of a small probe. A male infant, aged 12 months, was first seen on account of attacks of fever and vomiting. He was a full term child, weighing 6 pounds at birth. Icterus neonatorum persisted for about 2 weeks. At 10 days of age he had a convulsion while nursing, but had no subsequent attacks. He was breast fed for 5 months, with the addition of one bottle daily of milk and water at 4 months of age. He was then weaned, and, not being able to retain milk and barley water or glaxo, was fed on peptonised milk for several months and, later, on Allenbury's foods, meat juice and Scott's emulsion. All his life he had been subject to feverish attacks, temperature 101° F.-104° F., with vomiting and loose green stools containing considerable mucus. These attacks had become worse since the age of 4 months. His weight was 1 ounce less than at the age of 5 months. On examination, the child was wasted and weak, but could hold his head up and sit up with a little assistance. He had no teeth, a small head (16¼ inches in circumference), a slight degree of hypotonia and was said to be Mongolian, though the evidence thereof seemed insufficient. The stomach was considerably dilated and gastric peristalsis was very marked with a doubtful swelling felt in the pyloric region. The diagnosis was suggestive of moderate pyloric stenosis, with secondary attacks of increase in the obstruction from spasm or swelling of the mucous membrane—on exploration 3 days later the pylorus was found widely dilated, and the obstruction was undoubtedly situated lower down, but the state of the child did not warrant further exploration or gastro-enterostomy. During the next 5 days he was free from vomiting and gained weight. At the end of another week he was not so well, having vomited considerable greenish fluid the previous night, and gastric peristalsis was marked. He was treated by lavage. On the next day he collapsed, the temperature rose to 104° F., and he died a few hours later.

At autopsy the stomach was found dilated and hypertrophied; pylorus widely dilated, admitting the first finger. The first part of the duodenum was dilated into a more or less spherical sac over 2 inches in diameter. The second part, for a distance of an inch, was extremely stenosed, merely admitting the passage of a probe; and the duct entered about the middle of the stenosed portion. There were no other abnormalities.

C. A. LANG.

BOEHME, GUSTAV F.: FATAL CASE OF ASPIRATION PNEUMONIA CAUSED BY THE INGESTION OF ZINC STEARATE. (Medical Record, August 30, 1919, p. 364).

The author reports the case of a child, aged 15 months, who swallowed at least 1 ounce of stearate of zinc powder. When first seen by the mother, the mouth and throat were filled with the powder, which also came from the nostrils with each respiratory movement. The child immediately became somewhat dyspneic and the abdomen was distended. When seen by the writer the child was resting quietly, but with inspiratory and expiratory dyspnea. There was marked lateral movement of the chest, the abdomen was distended and tympanitic, and a mild degree of cyanosis was present. Pulmonary examination revealed fine râles over the whole chest. Temperature, 99° F. Twelve hours later the child was more markedly cyanosed, the respirations were dyspneic, with a reversal of the pause and a slight expiratory grunt. The abdomen was less distended, having been relieved by enema and catharsis. The râles were coarser and more bubbling in character, the left base showing some dullness and evidences of a beginning consolidation; temperature, 99° F; pulse, 150. The child had had a slight cold for 4 or 5 days previous to the ingestion of the powder, so it was presumed that it had a mild bronchitis, which, due to the aspiration of the zinc stearate, was converted into a bronchopneumonia, with acute edema. The child died of acute edema and cardiac distention within 36 hours of the inhalation of the powder. The temperature just before death rose suddenly to 102° F., and the respirations, rose to 80, were shallow and markedly obstructed. The conclusion was that the child died from an aspiration bronchopneumonia, due to the aspiration of zinc stearate.

C. A. LANG.

FISCHER, LOUIS: THE ABUSE OF CATHARSIS AND LAXATIVES IN INFANCY AND CHILDHOOD. (Medical Record, August 16, 1919, p. 275.)

The daily administration of laxatives and correctives to infants and children is a common practice amongst many mothers and nurses. The author states that while the daily use of drugs may be required for a short time to stimulate the secretions and cleanse the gastrointestinal tract, it is unnecessary to continue this practice over a period of many months. In acute febrile manifestations or in toxic and septic conditions, where sluggish or pseudo-paralytic functions exist, laxatives are indicated, and are urgently required to eliminate stagnant residue and fermenting particles of food and their toxins, which might be absorbed into the circulation. This is especially true in intestinal intoxication, accompanied by fever, caused by excessive fat or protein feeding. The pernicious habit, however, of giving a daily laxative lessens the functional activity and weakens the intestinal mucosa. This will in time result in a total loss of the peristaltic waves that coarse food will produce if regularly fed. While we attain the object of cleansing and eliminating fecal particles, we frequently interfere with the normal process of digestion and assimilation and deprive the system of nutrition intended for growth. He condemns the use of warm soap-water enemas, as well as the habit of adding correctives to the infant's milk daily. He emphasizes the importance of giving pure filtered cool water between meals, several times daily. In older children, the mechanical stimulus in the atonic gut can be given to food by the addition of bran to cereals or by the use of figs, raisins, whole wheat bread, and the coarse cereals, such as oatmeal; also the green vegetables, such as chopped spinach and string beans. Deficient peristalsis can be stimulated by colon massage, gymnastics, or calisthenics. In some instances gentle faradization, or the high-frequency current, applied in 2-day intervals, will aid in stimulating the internal functions and in promoting peristalsis. In subnormal nutrition, where rachitic atonics of the intestine exists, there is no drug that will aid nutrition and modify constipation better than cod-liver oil. Olive oil enemas in infants are valuable, but should not be used more frequently than every other day. The use of thyroid extract and pituitrin he has found successful in a moderate number of cases.

C. A. LANG.

MOODY, ELLSWORTH: RECURRENT VOMITING IN YOUNG CHILDREN. (Journal of the Missouri State Medical Association, August, 1919, p. 257.)

The author gives a short review of the literature on recurrent vomiting in young children and describes briefly the 4 cases which have come under his observation and have been apparently benefited by preventative treatment. All 4 cases were girls between 3 and 5 years of age; all had been subject to these attacks for a year or more, which came on without premonitory symptoms or demonstrable cause, and occurred once every 3 or 4 weeks. All 4 children had had their tonsils removed; none showed evidence of diseased teeth and all showed pus cells, acetone and diacetic acid in the urine. In two of the children the vomiting was usually followed by loose stools for 3 or 4 days, but without other evidence of gastrointestinal pathology. Treatment did not seem to affect any of the cases during an attack; alkalies by mouth, even in minute doses, were always vomited and the feeding of 5 per cent glucose by rectum, in alkaline solution, did not seem to be beneficial. After all cases had been seen in one or two attacks the following procedure was outlined: Sodium bicarbonate 0.6, with brandy 0.18 in a tablespoonful of water, were given 3 times a day as routine. When the child showed the slightest evidence of a possible impending attack, sodium bicarbonate 0.9 with brandy 0.3 was given every hour for 7 doses and followed by a phenolphthalein cathartic. Since this treatment was started, more than 3 years ago, one child has been absolutely free from the attacks; one has had 2 attacks and two have had 1. The parents have decreased the dosage for all of the children so that now 2 are receiving sodium bicarbonate 0.3 once daily and the other two only occasionally.

C. A. LANG.

MARRIOTT, W. MCKIM: THE ARTIFICIAL FEEDING OF ATHREPTIC INFANTS. (Journal of the American Medical Association, October 18, 1919, p. 1173.)

Marriott uses the term "athrepsia" in referring to the condition of extreme malnutrition of infants, otherwise known as "marasmus," "infantile atrophy," or "decomposition." In regard to its pathogenesis it may be considered as the end result of an insufficient intake, or of a failure to utilize food in sufficient amount to supply the demands of the body; in other words, a condition of

virtual starvation. In this condition the volume flow of the blood is diminished. This diminished volume flow, it has been shown, is dependent, in part at least, on a decreased blood volume seemingly the result of a decreased protein content of the plasma, and consequent inability of the blood to maintain its water content. There is, therefore, an atrophy of the blood as well as of the rest of the body. The obvious remedy being food, and the intestinal tract of these infants being weak, one is confronted with the problem of feeding a large amount of food to an infant who is incapable of taking care of even small amounts of ordinary food. Glucose injected parenterally has distinct limitations and is only a temporary expedient. Transfusions and intravenous gum acacia saline mixtures fall under the same class. Breast milk might meet the needs of the child, but it is not always available.

It has long been a matter of common knowledge that infants, suffering from gastrointestinal disturbances, are able to take larger amounts of milk artificially soured by lactic acid organism than they can of sweet milk. The author, therefore, determined on a lactic acid milk as a basis in feeding athreptic infants on the assumption that a certain amount of fat can be tolerated, especially in lactic acid milk, and remembering that the 2.5 per cent of fat in protein milk, and the fat in buttermilk is well taken care of, he used undiluted lactic acid milk containing amounts of fat up to the amount contained in whole milk. To this was cautiously added carbohydrate to increase the caloric value. A non-readily fermentable sugar was selected and corn syrup, otherwise commercial glucose, a mixture of dextrin, glucose and maltose, was the sugar of choice. This mixture was added up to 10 per cent with little or no tendency to diarrhea. In addition, corn syrup in a 5 per cent solution was given almost ad libitum between feedings to supply further calories.

The preparation of the mixture is as follows: whole milk is sterilized by boiling, cooled to room temperature, inoculated with a culture of Bulgarian bacillus or other lactic acid producing organisms, and incubated over night. This should be a thick, creamy, homogeneous mixture. The usual commercial corn syrup in a 50 per cent solution is then added. Care should be taken not to agitate the mixture sufficiently to separate the fat as butter. This is kept in a refrigerator until used. As it is very thick, a nipple with a large hole must be used in feeding.

It is advisable to begin with a mixture of equal parts of whole lactic acid milk and buttermilk. The buttermilk is gradually taken away until whole lactic acid milk is used entirely. The syrup is then added, 3 per cent as a starter, and is gradually increased according to the infant's tolerance and the amount of food necessary to cause a gain in weight, sometimes the sugar content being as high as 15 per cent.

Forty infants were fed by the author, the majority being between 2 and 5 months of age. Eight weeks was the longest time any of them were kept on the formula. He feels from the results obtained, that although this type of feeding is not a panacea, yet we have a formula which enables one to administer a considerable amount of nourishment in an easily assimilable form to infants needing a large amount of food but having an intolerant gastrointestinal tract.

HAROLD R. MIXSELL.

GUTHRIE, DOUGLAS: AURAL SUPPURATION IN EARLY CHILDHOOD: ITS PREVENTION AND TREATMENT. (*The Lancet*, September 6, 1919.)

Because 90 per cent of the work at ear and throat clinics is either for tonsil-adenoid disease or aural suppuration, and because of their serious results, the author feels more attention is due these conditions. Ill health from swallowing septic material, enteritis, or even meningitis are not unusual complications, and deafness is a frequent result.

Anatomically, the mastoid process is not developed in infancy nor until the second year, but the antrum is relatively larger, well drained and close to the surface of the skull. It lies higher in reference to the middle ear than in the adult. The Eustachian tube is relatively shorter, wider and more horizontal, therefore draining better but being more open to infection than in the adult.

Eight observers at post-mortem examination found 82 per cent of the middle ears involved, pneumococcus and streptococcus being the organisms usually found. The commonest cause in infancy is the ordinary cold.

The temperature may be high, or not over 100°F, at which level it may persist for some time after subsidence of inflammation. Pain, as shown by crying, sleeplessness and boring of head in the pillow, is frequently present, though it may not be constant

and may even be absent. Sometimes there are symptoms suggesting meningitis. Generally the drum perforates in 3 or 4 days and the ear is dry in 2 or 3 weeks.

If the seat of infection is elsewhere in the middle ear, the drum may appear normal. Also when a child cries the drum is red. Both of these facts make diagnosis difficult from direct examination of the ear drum alone.

Mastoiditis is not common considering the frequency of otitis in children.

The treatment of the otitis includes the use of cocaine, carbolic and glycerine drop and a free myringotomy under general anesthesia. The small clot forming over the incision should be syringed away a moment or so after opening. Pus may not appear at once, but a couple of days later.

Tuberculosis, as a cause of persistent aural suppuration, not uncommon in infancy, becomes less frequent as age advances. Thirteen out of 150 cases of chronic aural sepsis were tubercular. In 12 the disease commenced during the first year of life, had a painless onset, showed enlarged glands around the ear, had produced a facial paralysis in 7 cases, and a mastoid abscess with fistula in 3. Ten of the 13 cases were bottle fed and in only 1 of these cases was the milk boiled. It would seem, therefore, that the infection was milk born. A very radical mastoid operation was done in 9 cases, 6 doing well as a result, 3 dying.

Therefore, the author offers briefly the following scheme of procedure in handling persistent aural suppuration: (1) cleansing and antisepsis of the ear by swabbing out with peroxide on cotton and later dropping in alcohol (only by the expert is syringing successful and advised); (2) removal of adenoids, including not only the large, firm growths, but the smaller, softer and more generally scattered and considerably diseased lymphoid tissue; (3) conservative operation, and (4) radical operation. The latter is seldom indicated in children. Therefore, the conservative mastoid operation in cases where (1) and (2) have not been successful in curing the condition in 2 or 3 months should be chosen. The antrum is opened, the greater part of the posterior wall of the bony meatus is removed, the aditus cleared, a wide meatal flap constructed and the bone cavity treated with bipp. Therefore drainage is provided while the drum and ossicles are left untouched.

HUGH CHAPLIN.

SPOHR, C. L.: THE RESULTS OF ROUTINE WASSERMANN TESTS IN CHILDREN. (*The Ohio State Medical Journal*, January, 1920, p. 21).

Using the Craig modification of the Wassermann test, specimens of blood were taken from 1,840 children at the Children's Hospital, Columbus, Ohio, with the following results: total positives, 9.39 per cent; negatives, 90.61 per cent. In only one of the cases was the disease acquired after birth.

The author reviews the literature of the Wassermann test in cases of hereditary syphilis as follows: Epstein at Prague, 33 per cent of 235 new born infants; Blackfan, Nickolson and White, 2 per cent of 101 patients; Holt, 6 per cent of 178 hospital children; Children's Clinic at Prague, 5.7 per cent of 2,533 infants; Elliot of Glasgow, 10 per cent of 130 children; Whitney, San Francisco Hospital, 2.9 per cent of 915 children; Churchill and Austin, Children's Memorial Hospital, Chicago, 3.3 per cent of 695 cases.

L. L. SHAPIRO.

BROOKS, ERNEST R.: ENLARGED THYMUS, SYMPTOMS AND TREATMENT. (*The Ohio State Medical Journal*, January, 1920, p. 23.)

The author makes the diagnosis of enlarged thymus, first, by the history and usual objective symptoms of pressure upon the upper respiratory tract; second, by percussion, using the so-called threshold method of percussion, third, the x-ray, which gives the most valuable information.

Two interesting cases are presented, showing very satisfactory results with x-ray therapy. This consists in from 3 to 6 treatments at intervals of a week for mild cases, and full doses repeated in 3 or 4 days for urgent cases. The therapeutic test of x-ray treatment in asthmatic cases, with no demonstrable enlargement of the gland, is advocated with gratifying results.

L. L. SHAPIRO.

MUSSIO-FOURNIER, J. C.: PARAPLEGIA FROM IDATID CYST OF THE CORD. (*Archives de Médecine des Enfants*, No. 2, 1919.)

Boy of 12, no history whatever, no hereditary stigmata. For 3 years had been suffering intermittently from severe pain in the upper spine, with some rigidity. These symptoms disap-

peared usually after 2 weeks of rheumatic medication. Two weeks before entering the hospital the pain had been more severe, descending along the sciatic nerve and preventing the boy from walking. Loss of sensibility to heat or pain was noticed along the territory of the eighth dorsal nerve, extending in lesser degree to that of the third and fourth sacral. All movements of the lower limbs were possible, although in lesser degree than normally. Exaggerated reflexes. Walk resembled that of a paretic, with great incoordination of movements.

Examination of the spine showed a painful spot at the fifth dorsal and at the posterior quarter of the sixth right rib. X-ray showed a process of osteitis. Normal spinal fluid, negative Wassermann and von Pirquet. As the patient was rapidly becoming worse surgical means were resorted to to determine the cause of spinal compression. During laminectomy a large number of idatid cysts were found in the perivertebral muscles of the region affected and also in the posterior perimeningeal space of the cord. What appeared to be the primary source of the affection was found in the right subpleuric region. C. D. MARTINETTI.

GAING, E.: PYLOROSPASM SUCCESSFULLY TREATED. (*Archivos Latinos Americanos de Pediatría*, September, 1917.)

The case in question was a girl born at term in good state of nutrition. Mother was able to nurse abundantly. After 19 days vomiting began, followed by exaggerated peristalsis. Vomiting continued incessantly in spite of changes of diet and even actual starvation. Weight decreased rapidly. After 12 days of sickness weight had decreased 1 kilogram, a pyloric tumor, contractile on percussion, had appeared. Percussion caused pain. After 26 days, feeding according to the Jbrahim formula was commenced, giving 5 c.c. every ten minutes. There was a slight improvement. Then as the maternal milk appeared to contain much fat this was carefully removed. Very decided improvement then set in. The quantity of milk was increased to 10 c.c. and then to 20 c.c. After 6 weeks the baby was able to nurse from the breast with very little vomiting. After 54 days exactly, she was entirely normal and continued to be so. The child was 5 years of age at the time of writing and had never had any trouble whatsoever with her digestive apparatus.

C. D. MARTINETTI.

LARSON, W. P.: PRINCIPLES OF FOREIGN PROTEIN THERAPY. (Minnesota Medicine, September, 1919, p. 332.)

The author states that medical men of to-day are beginning to doubt the principle of specific therapy as numerous cases have been reported in which a vaccine or a protein entirely foreign to the infectious agent has improved or cured the infection. This has been seen when a chronic infection of long standing disappears sometimes completely as a result of the incidence of some other infection such as typhoid fever, erysipelas, etc., or when the condition of eczema disappears following the administration of typhoid vaccine. Likewise, during the past year, favorable results have been reported for treating chronic arthritis with typhoid vaccine. Larson explains this by referring to Ehrlich's theory that two antigenic stimuli are necessary to bring about antibody productions, one stimulus causing the tissue cells to produce antibodies, and the other causing the cell to throw off these antibodies into the blood stream—*i.e.*, specific and exfoliative stimuli. He also states that an antibody attached to a body cell is not only valueless, but positively a liability while so attached. He then proceeds on the theory that many bacteria such as streptococci, pneumococci, etc., are imperfect antigens, not possessing the second stimulus (exfoliative) that is necessary to cause the antibodies to be thrown off into the blood stream, and therefore, not sufficient immunity results to cause the infection to subside. This stimulus he believes was provided by the foreign protein: typhoid vaccine, foreign serum, proteoses, etc. By means of experiments carried on by immunizing rabbits against sheep corpuscles, it was found that animals producing a serum of low or mediocre antibody content, would often produce a serum of unparalleled potency following the injection of a foreign protein such as typhoid vaccine or ascitic fluid. It was also found that in animals producing a serum of high antibody titer, this could not be augmented by injecting foreign protein. He draws the deduction that the therapeutic effect of foreign protein in certain cases, is due to the non-specific exfoliative stimulus which it provides, and which cause the antibodies that have remained sessile, and associated with the cell which produced them to be thrown off into the blood stream.

JAMES HOYT KERLEY.

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ORIGINAL COMMUNICATIONS

IMMUNITY IN SYPHILIS WITH SPECIAL REFERENCE TO CONGENITAL OR PRENATAL SYPHILIS.*

By JOHN A. KOLMER, M.D., DR. P.H., M.Sc. (HON).

Professor of Pathology and Bacteriology in the Graduate School of Medicine of the University of Pennsylvania; Head of the Department of Pathology of the Dermatological Research Laboratories of Philadelphia.

In view of the widespread distribution of syphilis and the danger of its parental transmission it would appear that few subjects are worthy of more attention and study on the part of pediatricists than congenital or prenatal syphilis; the now well known dictum of Osler, "know syphilis in all its manifestations and relations and all other things clinical will be added unto you" has as

*Presidential address delivered before the Philadelphia Pediatric Society, January 13, 1920.

much bearing upon this form of the disease as that acquired by adults. At the present time there is a general awakening of the profession to the prevalence of syphilis and its important relation to public health, and systematic efforts are being made to facilitate its diagnosis and treatment; as stated in my address before this Society last year¹, pediatricists should not fail to take an interested and prominent part in this movement because of the unfortunate possibility and probability of the disease being transmitted to offspring by a syphilitic father or mother.

That our knowledge of congenital syphilis is inadequate cannot be denied; there are few subjects more worthy of clinical and laboratory investigation and especially as bearing upon the mode of transmission and the clinical signs and symptoms of the infection. It is not my purpose to enter into these phases of the discussion; there is little in the nature of definite data on the mode of transmission and abler hands can present the clinical features. I am quite sure, however, that with further investigations we shall learn to recognize that prenatal or congenital syphilis is more common than surmised and that much can be done for the improvement of infant mortality by closer study of this disease.

In pondering over the matter of a suitable subject for this address, which is one of the duties imposed upon your president, I have thought that a review of our present knowledge of immunity in syphilis may be of some value in this symposium; it is important for example, to know how much we may depend upon nature in the cure of syphilis and how much resistance the unborn fetus may possess to infection. These subjects are of particular importance when we realize that very probably a large portion of syphilitics are undiagnosed and a still larger number receive inadequate medicinal treatment or none at all.

If the mere presence of living treponemata in the potential father or mother, or both, means the possibility of prenatal infection of their children, then the subject of immunity becomes very important and I may state at the outset, that all of our present information indicates that complete sterilizing immunity, that is, complete cure, occurs but rarely, if at all, without specific medicinal aid, and that while the untreated parent may acquire some resistance, he or she will probably always harbor virulent treponemata capable of causing recrudescences of the disease in tissues and organs of diminished resistance and eventually kill by degen-

erative processes. Clinical opinion is generally to the effect that while the male is infectious for only 2 to 5 years after contracting the disease, depending upon the kind and thoroughness of treatment, and that he infects his child by first infecting his mate rather than by direct primary infection of the ovum with treponemata carried over in his semen, the mother may continue to transmit the disease for a longer period of time and bear syphilitic children for years after the disappearance of her own symptoms; it is probable, however, that further investigations will show that the untreated and uncured syphilitic of either sex may continue to transmit treponemata of attenuated virulence for longer periods, the lesions and symptoms of the transmitted disease being correspondingly mild and apt to escape clinical detection and particularly by those physicians whose knowledge of the disease is limited to the text book descriptions of the typical and relatively severe forms of syphilis seen in the new born. For these reasons we must refine our clinical perceptions and laboratory tests and devote closer study to the subject of familial syphilis in all its phases; unfortunately the disease may manifest itself in so many different ways and involve so many different organs that no one physician is prepared and equipped to make the necessary study, this being possible under best conditions only with the assistance and coöperation of others especially prepared as specialists in the diagnosis of disease of special organs.

Our knowledge of immunity in syphilis has been greatly advanced since the discovery of *treponema pallidum* by Schaudin, by means of animal experimentation with apes and rabbits; and since the cultivation of this microparasite in vitro in pure culture by Noguchi. Prior to these epoch making discoveries, opinions were based upon clinical impressions and relatively few experiments upon willing volunteers. The general results of inoculation experiments has been to show that the syphilitic person or lower animal acquires definite resistance to reinoculation soon after the appearance of the initial lesion and at a time when the microparasites may be regarded as having gained a wide distribution; this resistance becomes almost absolute during the secondary or most active period of the disease, declining somewhat in the tertiary stages. With complete cure there appears to be a gradual return to susceptibility to reinfection, a fresh instance of this being recently recorded by Dr. Schamberg.² Of

particular importance therefore are the well established facts that the only persons or such lower animals as apes and rabbits possessing resistance to syphilis are those harboring living treponemata and that this resistance rapidly disappears with the sterilization of the body, indicating that antibodies, if produced at all, do not persist in the body cells and fluids as occurs in many other of the infectious and notably in the acute infectious diseases. As Neisser has said, direct inoculation with syphilitic virus is the best index of cure or persistence of the disease. He found in his experiments with apes that immunity existed only while the animal harbored living treponemata. Susceptibility to reinfection followed cure by specific medicinal agents.

Resistance to reinfection, however, cannot be said to be absolute in any stage of the disease; there are a sufficient number of experiments to indicate this and of course, it is well known that the uncured syphilitic is subject to recrudescences and new organs and tissues may be successively attacked during the progress of the disease. Animal experiments have shown that this immunity in syphilis or resistance to reinfection is largely local in nature; in monkeys and man where the microparasites are rapidly distributed throughout the body, resistance becomes more general and complete, but in rabbits, in which the lesions develop in a few organs only, notably the testes and cornea, resistance is apparently limited to the particular organ or organs that have previously been the seat of a lesion.

A study of the body fluids and especially blood serum and cerebrospinal fluid of syphilitics have shown that known antibodies are not developed at all or but to a slight extent. Following the successful cultivation of the treponema by Noguchi, I found that agglutinins were produced in rabbits by immunization with these cultures,³ but only to a slight extent in persons suffering with syphilis;⁴ treponemicidal substances could not be demonstrated in the blood at all in any stage of the disease. Subsequent experiments by Zinsser, McBurney and Hopkins⁵ have shown, however, that these agglutinins for culture pallida do not agglutinate virulent pallida, thereby reducing in value any significance that may be attached to the immunological significance of agglutinins in so far as resistance to syphilis is concerned. It is highly probable that phagocytosis of virulent treponemata likewise plays but a minor rôle in resistance to infection by normal tissues al-

though the resistance of syphilitic tissue to reinfection may be due in part to local phagocytosis by the fixed tissue cells, constituting in part the "tissue indifference" or "anergie" of Neisser.

As is now well known, the Wassermann reaction cannot be regarded as indicating the presence of protective antibodies, inasmuch as the reaction is biologically non-specific and due to the presence of a secondary product of the body cells, treponemata or both, independent of true resistance or immunity. Complement fixation tests conducted with salt solution extracts of pure cultures of *treponema pallida* may be accepted as indicating the presence of *pallida* antibodies, but the percentage of positive reactions is relatively small and weak in all stages of the disease and their significance, as an indication of immunity, further diminished by the experiments of my colleagues and myself⁶ and later confirmed by Zinsser and his associates, showing that the positive reactions are in part non-specific as is the Wassermann reaction, due to the presence of lipoidal substances which may be obtained from other microparasites as *B. typhosus* and *B. coli*. The Wassermann reaction is an indication of infection and to a certain degree of the severity of the infection, but it is not an expression of immunity. While biologically non-specific, its practical diagnostic value remains high and scarcely to be over-estimated, because the peculiar changes in the serum and spinal fluid responsible for the reaction appears in so few other diseases despite the fact that a review of the early literature leaves one with the impression that it may occur in all the diseases to which human flesh is heir.

The luetin anaphylactic skin test is likewise a reaction of infection rather than of immunity. My own studies with this and similar reactions⁷ have indicated quite clearly that the positive reaction is not to be accepted as an indication of immunity; in this connection, I may state that subsequent studies have shown that anaphylactic skin reactions, including the tuberculin reaction, are produced only in the presence of living infection and that their severity is to a certain degree a measure of the acuteness and extent of the particular infection under study. While Noguchi believes that a positive luetin reaction may occur after the cure of syphilis due to the persistence of antibodies after complete sterilization, it is highly probable that a persistently positive skin reaction is like the persistently positive Wassermann reaction an

indication of incomplete cure, even though the patient is clinically free of the disease.

All studies indicate, therefore, that unfortunately persons possess no natural immunity to syphilis; when such appears to be the case, it is highly probable that the immunity is due to the fact that they harbor living treponemata; apparent exceptions to this rule, as when one man contracts the disease from a woman while another escapes even though exposed by intercourse either immediately before or after, are most probably to be explained on the basis of injury to the epithelium, the former having an abrasion or portal of entry for the virus and the latter not. Even when infection occurs, the resulting immunity is but of minor degree, probably sufficient to protect the majority of persons against reinfection but not enough to protect themselves against extension of their own infection to new tissues or organs in their own body; the antibodies in cells and body fluids are so few as to largely escape detection and rapidly prove ineffective for protection after complete cure. In other words, the only persons apparently immune to inoculation with syphilis are those who are actually syphilitic, although their infection may be dormant and escape clinical detection, but frequently discovered by such immunological tests as the Wassermann and luetin reactions.

It is now pertinent to inquire what relation these facts have to the subject under discussion, namely, congenital or, what I prefer to designate as prenatal syphilis, when referring to infections occurring in utero.

In the first place, it appears quite certain that the great majority of syphilitics, and particularly among the white race, have no natural means of curing themselves; that while the body cells in a local part or as a whole in general syphilis, may become resistant to reinfection as long as living treponemata persist in the body, the actual degree of curative immunity is relatively slight and scarcely more than may bring about a disappearance of obvious lesions and hold in check the disease for a longer or shorter time. This means that every untreated or inadequately treated syphilitic of either sex and particularly the woman of child bearing age, is potentially capable of transmitting the disease and the number of such persons must be appallingly large.

In the second place, it would appear quite certain that the fetus possesses no natural resistance to infection with treponema

pallidum in so far as its own tissues are concerned and that it may be infected through the mother at any time from conception to late in pregnancy. Fournier taught that if the mother contracted syphilis after the sixth month of pregnancy, the child may escape but there are now authentic instances on record of later infections; the escape of the child in the last month or two of pregnancy, however, is not to be ascribed to natural immunity but rather to the fact that sufficient generalization of the infection of the mother has not taken place with the passage of treponemata from her circulation to the tissues of the child.

The interpretation of the law of the celebrated Irish surgeon, Abraham Colles, announced in 1837 and independently by Baumés in 1840, is now readily understood; according to this so-called law the apparently healthy mother of a syphilitic child may suckle her offspring without danger of contracting syphilis, whereas a healthy wet-nurse may become infected and usually with the production of a chancre on the nipple. Since the mother appeared healthy it was naturally surmised that she had been immunized to syphilis as the result of carrying in her uterus a syphilitic child; it is now known, however, that the blood sera of a large percentage of these mothers yield positive Wassermann reactions and according to Keyes, the majority develop tertiary syphilis in later years. These facts indicate that there is very probably a sufficient degree of true immunity produced to keep the infection of the mother in a latent or dormant condition but not the high immunity supposed to exist by Colles and universally believed until a few years ago, the resistance of the mother to reinoculation by her child being due rather to a state of "anergie" or local resistance of the tissue cells as a result of the presence of living treponemata in her body.

Likewise, the so-called law of Guiseppe Profeta, promulgated in 1865, has undergone a similar revision; according to this law an apparent healthy child, born of a syphilitic mother, may be nursed by its mother or a syphilitic wet-nurse with impunity, whereas another child may be infected with syphilis by either woman. This so-called law was based upon the assumption that the child was immunized in utero against syphilis by its syphilitic mother, and this may be true to the limited extent of being able to keep virulent treponemata in a dormant state, but the real resistance of the child to infection is probably due to the presence

in its little body of living treponemata and these children are especially deserving of close clinical and serological study for the evidences of latent syphilis.

Therefore, the majority at least of apparent healthy mothers of syphilitic children, and the apparent healthy children of syphilitic mothers may be regarded as infected with syphilis and especially so if both have been exposed to inoculation and have escaped, which is probably the best evidence of local tissue resistance due to latent syphilis; certainly all attempts to confer immunity in syphilis by either active immunization with vaccines of treponemata or by passive immunization with the injection of blood serum from syphilitics, may be said to have failed because free antibodies in the blood are not produced in syphilis and certain other protozoan infections to anything near the same extent as in the majority of bacterial infections. In other words, there is no evidence to support the original beliefs of Colles and Profeta that antibodies against syphilis are produced by the cells of a syphilitic mother and passively transferred to her child or that these are produced by a syphilitic child and passively transferred to its mother.

As part of the present day propaganda for the wider recognition of syphilis and its adequate treatment, I would urge upon pediatricists the closer clinical and immunological study of all children born of syphilitic parents, even if the only evidence of syphilis in the latter is a positive blood Wassermann; likewise the children born of a marriage in which one or both of the parents are known to have had syphilis but pronounced cured or safe on the basis of treatment, should receive special study. As previously stated, these clinical studies may require the services of several specialists working in coöperation because syphilis may manifest itself in so many ways and attack practically every tissue and organ of the body. It would also appear advisable to regard every child of syphilitic parentage as infected and administer antisyphilitic treatment even though it appears healthy and gives a negative Wassermann reaction; the same practice should hold for the apparently healthy mothers of syphilitic children. The adoption of these rules may mean that sometimes treatment may be given unnecessarily to both mothers and children because there is much clinical opinion to support the view that syphilitic parents may not transmit the disease, but our knowledge of the transmis-

sion of syphilis is woefully incomplete and I personally believe it safer practice to regard the possibility of transmission always present as long as either or both of the parents are uncured and especially so, since the amount of investigation upon congenital or prenatal and familial syphilis is comparatively small and its clinical detection apt to escape the majority of physicians; further than this by reason of the latency of these infections there may not be either clinical or immunological evidences of the disease at a given period which constitutes another argument in favor of the routine treatment of all children of syphilitic parents and all apparently healthy mothers of syphilitic children, if the physician regards as good practice the treatment of latent syphilis.

In both classes of patients the provocative Wassermann test may prove of value in aiding diagnosis, but since the Wassermann test is not yet sufficiently delicate, too much weight must not be placed upon a negative result. It is among this class of persons and especially children with latent congenital syphilis, that I have found the luetin test of considerable value and when undoubtedly positive, it may be accepted as evidence of syphilis even in the absence of definite symptoms and with a negative complement fixation test.

In conclusion, I beg once again to express the same hopes voiced in my address before this Society last year, namely, that the interests of individual pediatricists and of local and national societies concerned in the welfare of children, will be aroused and stimulated to more intensive study of congenital or prenatal syphilis, as part of the nation wide program to reduce the incidence and mortality of syphilis in the interests of public health and welfare. At least clinics devoted to the prenatal care of women and children can do much if organized upon a coöperative plan, designed to give the subject of prenatal and congenital syphilis the intense clinical and laboratory study that the subject deserves in view of the widespread dissemination of the disease, the frequency of inadequate treatment and eminent possibilities of transmission to the unborn.

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RAPID DIAGNOSIS OF DIPHTHERIA BACILLI (Presse Médicale, Paris, Sept. 11, 1919). Debré and Letulle expatiate on the differential importance of Babes' polar granules, shown up by double staining, in true diphtheria bacilli. Their two years of experience with this method of differentiation has confirmed its precision and reliability. The pseudodiphtheria bacilli never show these granulations at the poles when stained by the technic described, which is a modification of Neisser's first method. The specimen is incubated at 35 C. for twenty hours and each loop of the culture is spread on two slides. One slide is treated with the Gram, the other after fixation by heat is covered with a solution made by dissolving 1 gm. of methylene blue in 20 c.c. of 95 per cent alcohol, and adding 950 c.c. of distilled water and 50 c.c. of glacial acetic acid. The smear covered with this solution is heated until it begins to steam. It is then heated a second time, and is then left in contact for five minutes. It is then rinsed rapidly with distilled water and then is covered with the second stain for ten or twelve seconds and rinsed quickly in distilled water. This second solution is made by dissolving 0.50 gm. vesuvine in 250 c.c. of boiling distilled water, filtering while still boiling. The granules clustered at the poles of the bacilli, or only in some of them, show up a black oval, and larger than the body of the bacillus. In their 800 tests they never found these polar granulated bacilli except with true diphtheria and they always found them then. They warn that one other bacillus may present these granulations, *Bacillus cutis-commune*. But they never found this in the throat in any of their tests. It differs from the diphtheria bacillus further in attacking saccharose. In case of diphtheric lesions elsewhere than in the throat, it might be advisable to test a loop on a sweetened litmus culture medium to exclude this bacillus.—*Journal A. M. A.*

THE PROBLEM OF THE PREMATURE INFANT.*

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The premature infant presents certain problems which must be met promptly and with minute attention to detail. Indeed, success in treatment depends largely on the care and treatment which the infant receives from the moment of its birth and the scrupulous and exact carrying out of every detail.

The first problem which presents itself is the maintenance of the body heat. There must be no chilling of the infant at birth. The baby should be immediately wrapped at birth in a previously warmed flannel blanket. It should then be removed to a hot room (80° to 85° F.) where it is cleaned and anointed with warmed olive oil. This process should be done as rapidly as possible and the infant should be wrapped in the warmed premature blanket and placed in the premature crib.

The premature blanket is made of 2 layers of canton flannel having an intervening layer of non-absorbent cotton. The blanket has a hood of the same material which covers the head. Only the face and buttocks are left uncovered. No diaper is used but a pad of absorbent cotton is placed under the buttocks. This may be changed when necessary without disturbing the baby.

The premature crib consists of a 24-inch clothes basket padded at the bottom with a layer of non-absorbent cotton to the depth of 8 inches. Over the cotton is fitted a sheet of oil-cloth and the edges are stitched to the basket. On the oil-cloth a small flannel blanket doubled on itself is laid, with a pad of absorbent cotton so placed on the blanket as to serve as the napkin on which the buttocks are placed. The sides of the basket are lined with pads or blankets. Half a dozen citrate of magnesia bottles, with wire and rubber corks, filled with water at 110° F. and covered with flannel are hung on the inside of the basket. The infant wrapped in the premature blanket is placed in the basket and along side of it is placed a thermometer. The ordinary bath thermometer protected by a wooden frame is very suitable for this purpose. A small blanket covers the lower two-thirds of the basket. A rub-

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ber sheet covers this at night or when the temperature of the room is lowered.

The thermometer in the basket should be kept at as even a temperature as possible for varying temperatures are prejudicial to the good of the infant. A temperature in the basket of 80° F. is sufficient for many babies, if the moisture in the air of the room is between 60 and 70 per cent. However, many infants require a higher basket temperature, i.e., a temperature of 85° F. and even of 90° F. If there is not sufficient moisture in the air of the room, the premature infant's lips and mouth become very dry and the appetite and digestion are disturbed. It is to be remembered in respect to the temperature, as in all the details of the management of the premature infant, that we are dealing with individuals and they must be treated as such. No hard and fast rules can be laid down which will be found applicable to all the babies and under all circumstances.

The temperature chart of the infant is the best guide as to the degree of heat which it is necessary to maintain within the basket. The rectal temperature of the infant should be taken and recorded each morning and evening. At first there is noticed a tendency to subnormal temperatures or to subnormal temperatures alternating with marked rises in temperature. The latter is likely to be the case if the bottles in the basket are filled with water at high temperature, or if all are refilled at once instead of the bottles being refilled in relays.

The temperature of the room should be 80° F. with sufficient ventilation to furnish an atmosphere that is constantly being replaced.

A premature ward should be equipped with a hygrometer.

The infant should be disturbed or handled only when absolutely necessary. The removal of the pad of absorbent cotton from beneath the buttocks of the baby can be accomplished without undressing the infant, as can the taking of the rectal temperature. The initial anointing with olive oil should suffice for 4 or 5 days, after which the baby may be oiled on alternate days. The premature basket or crib should be so placed that the infant is not subjected to either bright sunlight or artificial light.

It is also important that only those adults whose presence is absolutely necessary should be admitted to the room. This rule

is obligatory because these premature infants are especially susceptible to respiratory infections.

The next and equally important problem, that of the nutrition of the premature infant, is usually a much more difficult one to solve. The needs of the premature infant are greater than in the case of a child born at term, yet the powers of digestion in the first instance are markedly less than they are in the latter instance. Whereas the normal infant at term requires 100 calories per kilogram of body weight to furnish the necessary heat, energy, and gain in weight, the premature baby is found to need from 120 to 180 calories. The explanation for this lies in the fact that in the premature child there is a rapid loss of body heat due in part to its proportionately larger body surface, with its thin, poorly developed skin, and small amount of subcutaneous fat, and in part to the unstable and inefficient nerve center regulating heat radiation.

The prognosis depends largely on the weight and length of the baby and the cause of prematurity, the weight being the most important factor.

Breast milk, either that of the mother or a wet nurse, should be employed in feeding premature infants. These babies are too weak usually to nurse at the breast, or to feed from the bottle, and require to be fed by means of the Breck feeder, or by gavage. The Breck feeder is a graduated tube with a small nipple on one end and a rubber bulb on the other. Breast milk is obtained by the breast pump, or by being expressed by the hand, and should at first be diluted and sometimes predigested before being fed to the baby. One may usually start with breast milk one-half and whey one-half. If the Breck feeder is used, from $\frac{1}{2}$ to 1 ounce may be given every 2 hours. If gavage is employed, the same or slightly larger amounts may be given, but at 3 or 4 hour intervals. Later the breast milk is given in gradually lessened dilutions until the baby is able to digest the undiluted breast milk. At the same time the quantity given at each feeding is also gradually increased and the period between feedings extended until the baby is taking 2 ounces every 3 hours, 7 to 8 feedings in 24 hours.

There is a great diversity of opinion as to the proper interval between feedings and consequently as to the number of feedings to be given in 24 hours. My own opinion is that we cannot be

dogmatic in this connection. We must, as the late Doctor Abraham Jacobi once said, in discussing this subject, "Use your brains. Every case has to be treated individually."

In general, if using the Breck feeder, the hours may be closer together as, the baby is likely to get smaller amounts, while if gavage is employed larger amounts are given at a time and hence are not needed so frequently. In either case vomiting is the danger signal which warns us of overfeeding and to it we must give immediate heed and at once either reduce the amount of food given at a feeding or increase the length of the interval between feedings.

The weight increases very slowly as a rule in premature babies and at first we must be satisfied with gains of 1 or 2 ounces per week.

Feeding with modifications of cow's milk is possible, but should be avoided, unless breast milk is not obtainable. Artificial feeding is very difficult and is accompanied by many risks as premature infants are very susceptible to gastrointestinal disturbances.

Whey, weak modifications of cow's milk boiled, either with or without predigestion with pancreatic extract, and artificial formulae, such as the formulae employed at Bellevue Hospital, New York, may be useful in feeding these babies. The formula used by Dr. La F  tra at Bellevue Hospital is as follows: 5 ounces of 6 per cent. top milk, 10 ounces of whey, 5 ounces of Imperial Granum water, and Dextri-maltose from $\frac{1}{2}$ ounce to $1\frac{1}{2}$ ounces.

While the premature infant should, as has been said, be moved and disturbed as little as possible, yet it is absolutely necessary to know that the baby is actually getting the amount of nourishment that it is intended it should have, and consequently, if there is any doubt about this the baby should be weighed before and after each feeding.

A liberal supply of body fluids should be maintained under all circumstances. This may make necessary the use of normal salt solution subcutaneously, or better intraperitoneally, or, as I prefer, into the longitudinal sinus. A 5 per cent. glucose solution may also be advantageously employed in using the longitudinal sinus.

Whatever method of feeding be employed in these cases, it is important to be on our guard for the regurgitation of food with

subsequent lodgment of a curd in the larynx. This may happen at any moment and if not promptly recognized and the infant quickly inverted may be, as has often been the case, the cause of sudden suffocation and death.

Cyanosis is a frequently occurring symptom in premature infants. It may be due to pressure, as in the case of tight or heavy covers; to feeble muscular power; to fatigue of the respiratory muscles; and to insufficient nourishment. To meet attacks of cyanosis and to combat them promptly is imperative. For this purpose a tank of oxygen should be kept constantly at hand. Also caffeine sodio benzoate.

The lessened immunity of the premature infant as evidenced by its extreme susceptibility to infections of the respiratory and gastrointestinal tracts, as well as to those of the skin, and the liability to general sepsis, is probably due to a smaller quantity of immune substances in the body, or to the immaturity of the organs that manufacture them.

As maternal milk tends to increase immunity this is an additional reason for insisting on the use of breast milk in feeding premature infants. Anemia is usually present in a greater or lesser degree in all premature infants and is due to an insufficient deposit of iron in the body.

As iron, phosphorus, and calcium are all stored up in the body of the infant during the last months of pregnancy, it is easy to understand the frequency of certain degrees of anemia in these premature babies and the relatively frequent development of various symptoms and signs of rickets in those who survive.

Anemia calls for the administration of iron in some form preferably in foodstuffs at as early a time as possible. And rickets requires the administration of phosphorus, calcium, and codliver oil as soon as these substances can be safely given.

FEEDING THE NEW-BORN*

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The problem of feeding the new-born is one which has come to us in comparatively recent times and may be considered an out-growth of our modern civilization. Until the middle of the Eighteenth Century, no scientific thought was given to the feeding of infants, the matter being left entirely to the mother or caretaker, and enveloped in ignorance and superstition.

In 1679, John Peachy published a work in which no mention is made of any but maternal feeding, even a wet-nurse being classed as an evil of the time. It is interesting to note also, that Peachy advised maternal feeding until dentition was complete, and with strict observance to wean the baby only when the moon was in its ascendancy.

Almost coincident with the birth of the baby, milk appears in the mother's breasts. This is the nourishment provided by nature, and that it is the ideal food for the new-born is now undisputed. It is preeminently available, automatically produced and convenient beyond anything that man could devise. That it is perfectly suited to the baby's needs has been proven scientifically in the laboratory, and practically, by all the generations that have gone before. It possesses all the elements that are required for normal growth and development of the infant, while being perfectly adapted to its digestion. There are exceptions to this generalization which will be considered later.

Perhaps more important than any of the other advantages of breast milk is that of safeness. Mother's milk is absolutely safe because of the method of its production and direct intake by the infant. All substitute foods, because of the complications of production, handling, and transportation, are bound to become heavily laden with bacteria.

Laboratory examinations and mortality and morbidity statistics furnish conclusive evidence of the foregoing statements. But one breast fed baby dies for each 6 artificially fed, and the susceptibility of the latter to disease is markedly greater. Griffith

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states that Moro has shown that although no bactericidal substances could be found in human milk, yet the blood serum of breast fed children exhibited a bactericidal power much greater than that of the artificially fed, and the former do not contract pyogenic diseases so readily. Specific agglutinins are also probably transmitted to the child through the mother's milk. Therefore, from these standpoints of availability, suitability and safeness, breast milk is the logical food for the new-born.

There is a fourth advantage which in the present day of high prices is not to be overlooked. To thousands of mothers the present cost of cow's milk and its products is prohibitive. The family at present is laboring under a heavy financial strain and the added expense of buying milk or other food for the new-comer is an unnecessary burden. Often only the poorest grade of milk is financially possible, and in a limited quantity. Finally, since ignorance and poverty usually are found in the same home, the mother is mentally unable to cope with the intricacies of modification, and an unsuitable and badly prepared mixture is inevitable.

If even a small portion of the time which has been devoted in years past to devising new and exact methods of artificial feeding, had been spent in encouraging and improving maternal nursing, many infants might have been spared the early struggle and suffering which is so frequently the lot of the bottle fed baby, and thousands of them could have been saved to their families and the State.

More and more is the importance of the feeding of infants becoming recognized as a subject worthy of special scientific study; one very practical form of this recognition is the practice now common among the better known obstetricians of referring the baby to a pediatricist for feeding and care, immediately following its birth.

Since maternal nursing is the most important function of motherhood, the preparation of the mother for the performance of the function is a vital part of prenatal care. With few exceptions, every mother can nurse her baby if she so desires.

In support of this statement the statistics of The Starr Centre in 1912-13 show that only 48 per cent. of the babies under care were breast fed. Now after 6 years of insistence upon breast feeding, the statistics of the last fiscal year show that of 92

mothers delivered, who had been cared for by the Pre-natal Department, 90 of these babies were entirely breast fed at 1 month of age, 1 partially breast fed and 1 bottle fed.

Attempts at maternal nursing should never be abandoned because of the delayed appearance of milk in the breasts, failure of supply due to nervous influences, shock, or an upset condition in the baby. In all such cases a little patience and encouragement will usually bring about success. The subsequent ability of the expectant mother to nurse her baby demands adequate pre-natal care of breasts and nipples to prevent depression or fissures. If the infant is given the breast at absolutely regular intervals during the first few days of life, there is reasonable probability that in every case the infant can be successfully nursed.

Preceding the birth of the baby and persisting for 1 or 2 weeks, colostrum is present in the breasts. This is believed by Pritchard to serve the purpose of developing the infant's digestion before the advent of the milk supply. An average analysis of breast milk is as follows:

Specific gravity, 10 28-34.

Amphoteric or faintly alkaline in reaction.

Fat, 3-4 per cent.

Protein, 1-1½ per cent.

Sugar, 6-7 per cent.

Water, 87-88 per cent., and the salts of calcium, magnesium, potassium, sodium and iron.

Talbot states that the percentage of lactose rapidly increases during the first few days of life; protein rapidly decreases, while fat remains practically constant. He further states that a specimen of fore milk is usually richer in sugar, while the after milk is richer in fat. Milk taken from both breasts simultaneously is practically the same in composition.

The production and quantity of breast milk is in direct proportion to the demand made upon it; the quantity in most cases being sufficient for the needs of the individual infant.

The quality, quantity and character of breast milk are all influenced by the habits of the mother. Special attention should therefore be given to her mode of living. Her diet should be liberal, well balanced and nutritious, including generous amounts of milk and water. One bowel movement daily and exercise in the open air are essential. Her life should be quiet and as free from

care and worry as possible, as any emotional disturbance may cause temporary lessening of the flow of milk, while anger or fright may render it unfit for the baby. Complete emptying of the breasts will greatly aid in the maintenance of the milk supply, and absolute regularity in nursing should be strictly adhered to from birth.

As soon after delivery as the mother's condition will permit, the baby should be put to her breast for a period of 10 minutes. This should be repeated every 4 hours until the appearance of the milk supply. After that, every 3 hours for 15 to 20 minutes, with but 1 night feeding.

The writer believes the 3 hour feeding interval during the early months of life necessary to provide the infant with its caloric requirements. These general rules apply only to the normal baby, exceptions must receive appropriate management.

During the first few days of life when there is no milk present in the breast and the baby is nourished entirely on colostrum, there is always a loss of several ounces in weight, which the writer regards as entirely physiological, being due to the process of adjustment from the fetal state to that of an individual organism. Attempts to prevent this loss have resulted in the employment of various forms of supplementary feeding, notably water, lactose, and wet nursing as studied by Griffith and Gittings. The conclusions of the latter, namely: that this loss cannot be entirely overcome and that such experiments do not offer sufficient advantages to justify their employment, are in accordance with our own views.

In spite of our firm contention that maternal nursing is the ideal method of feeding the new-born, it must be conceded that frequently cases are met which severely try the skill and patience of both physician and mother.

The prominent symptoms which confront us in disturbed digestion in the early weeks of life are regurgitation, vomiting, colic and undigested bowel movements. Added to these may be mentioned the one which gives the mother the greatest concern and is the surest index of the baby's condition to the doctor, viz: failure to gain, or actual loss in weight of the infant. All these symptoms require investigation to ascertain the exact cause of the disturbance. A chemical examination of the breast milk at the outset often aids in detecting the source of trouble. A moderate degree of regurgitation in the breast fed baby may be considered physio-

logical, as sometimes no limit is put on the length of time of nursing and the baby gets too much and the excess amount is regurgitated.

Excess of fat in the milk may result in sour vomiting with an odor of butyric acid. According to Griffith, when there is an excess of fat intake or an inability on the part of the baby's digestion to properly handle the ingested amount, the condition is manifested in the stools in 3 distinct types: (1) soap stool, containing an excess of fatty acids combined with calcium or magnesium to form soap. The color, white or grey, shiny, fairly firm, homogeneous, crumbly or salve-like, acid in reaction and having a rancid or sour odor; when combined with protein, cheesy in odor and alkaline in reaction. (2) fatty stool, bright yellow, soft and greasy, containing a large amount of neutral fat and fatty acids, sometimes thin and frequent enough to suggest fatty diarrhea. (3) curdy stool, numerous large or small curds, acid in reaction, the curds are usually soft, white, composed of fat; aside from the white curds the stool is green and yellowish, diarrheal, and mucus is always present.

Excessive amounts of protein cause colic while the stools are alkaline in reaction, brownish yellow of putrefactive odor, and mucus is always present. Occasionally, tough, yellowish protein curds are found. Excessive sugar is rare, but if present may cause watery vomit with irritating, watery or frothy bowel movements, sometimes green in color, which excoriate the skin of the buttocks and thighs.

Occasionally cases occur in which both fat and protein are present in amounts to which the infant's digestion is unequal. Such cases occur in overfed mothers who take insufficient exercise. Dietetic and hygienic measures on the mothers part are usually sufficient to correct the difficulty. Milk rich in protein and low in fat is usually found in nervous, overworked, under fed mothers, overburdened with cares and anxiety. The babies suffer with vomiting, colic and loose, offensive stools. The correction of these cases becomes a difficult problem, but breast feeding should be persisted in, unless the condition of the baby is steadily downward.

Underfeeding is usually indicated by an unsatisfied condition of the baby, restlessness, crying before nursing intervals and during the act of nursing, because of the inability to get sufficient milk,

or as rapidly as desired. These symptoms are associated with small brownish or brownish-green stools with mucus. Under such conditions baby should be weighed upon a beam scale before and after nursing, and the gain in weight accurately noted. It is also well to determine the total weighings for a 24 hour period, in order to estimate the caloric intake which in a new baby should be 100-120 calories per kilogram of body weight. A very young baby should gain $\frac{1}{2}$ to 2 ounces at each nursing. The best dietary stimulants for the mother of an underfed infant are milk, cocoa, water and gruels. Fats are increased by feeding with fats; carbohydrates, by limited exercise.

Intercurrent disease in the mother of a transient nature is not sufficient cause for weaning the baby. The baby may be nursed on a substitute mixture, measures being taken to retain the mother's milk supply until the baby is returned to the breast.

Galactogogues have been proven to be worthless. Hess believes that massage and steaming the breasts are of decided value in improving the milk supply. Only after persistent efforts at maintaining the milk supply of the mother and modifying it in every conceivable manner to fit it to the infant's digestion, and there is still a failure to gain, or an actual loss of weight of the infant, should maternal nursing be discontinued. Any serious organic or systematic condition in the mother, viz.: tuberculosis, chronic heart or kidney disease, typhoid fever, rheumatism, or septicemia, contraindicate breast feeding. However, if weaning becomes necessary, a wet-nurse is the next best choice, and if this be impracticable, artificial feeding is the only alternative.

No method of artificial feeding can perfectly replace maternal nursing. As nearly as possible the different constituents of the substitute milk should resemble those of the mother's milk, both in their chemical composition and in their behavior to the digestive fluids. These conditions are fulfilled only by the fresh milk from some other animal. Cow's milk, for practical reasons, has been found to be the one best suited for the purpose. The chief differences between breast milk and cow's milk lie in the character of the fat, protein and salts. It has been definitely established that fat plays an important part in the nutritional disturbances of the artificially fed infant. The butter prepared from cow's milk contains 10 per cent. of volatile acid, while that prepared from human milk only 1.5 per cent.; also the irritant butyric acid glycerid,

which occurs in 6 per cent. in the butter of cow's milk, occurs only in traces in human milk. The fat globules are much larger than those of human milk. The protein of human milk consists of .59 per cent. casein and 1.23 per cent. lactalbumin, while cow's milk contains 3.02 per cent. casein and .53 per cent. lactalbumin. The curd from cow's milk is usually tougher and occurs in larger masses than human milk, thereby throwing extra work upon the infants' digestion. The salts of cow's milk consist mainly of potassium and sodium bases.

During the first few weeks of life, cow's milk should be highly diluted, boiled, and less sugar added than for older infants. While a highly diluted formula gives a lower caloric value than will meet the infant's requirements, it is important to begin with a dilution not greater than one-sixth to one-fifth of whole milk and to strengthen the formula gradually in order to accustom the infant's digestion to this form of food. The quantity given at birth should be $1\frac{1}{2}$ to 2 ounces, increasing gradually according to age. The same general rules apply as for maternal nursing.

It would be impossible to attempt to discuss in the brief time remaining, all the difficulties of artificial feeding. Every baby's metabolism and digestion is an individual problem, and each case requires observation to determine the formula, interval, and nursing period best suited to its needs. Milk used for artificial feeding should be produced under the best possible conditions from tuberculin tested cattle. Whenever the financial status of the patient will permit, certified milk should be used as this is the only raw milk on the market, practically safe. Special emphasis should be laid upon the care of the milk in the home to keep it safe and the physician should teach and insist upon careful handling in the process of modification.

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THE NEWER KNOWLEDGE OF THE NEW-BORN.*

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Much remains to be done to determine what the new-born baby is chemically, or metabolically if you will. However, results that have accumulated from the investigations of different observers have already thrown considerable light upon this subject. In this paper there will be presented some of this newer knowledge, much of which has a practical bearing in the care of the young baby. In addition, and allied to a certain extent with the chemistry of the child, are phases of the question of immunity against disease which the new-born possesses. This, with the gastrointestinal physiology, may be considered with profit in connection with the normal metabolism.

A large percentage of babies die in the first weeks of life. Most of these deaths can be attributed to premature birth, congenital malformation, congenital or inherited disease, injury at birth or to that rather ill-defined condition called "congenital debility." The importance of the death rate in the new-born is emphasized when a few statistics are studied. In Philadelphia, in one year (1917), the infant mortality exclusive of still-births was 4617.¹ Of these deaths, 507 occurred in babies less than 1 day of age; 1149 in babies less than 1 week of age, and 1800 in babies less than 1 month of age. In other words, almost 40 per cent. of the babies who died before the age of a year died in the first month of life. It should be stated that almost half of the 1800 deaths occurring before the age of 1 month were in premature infants and most of these died before the age of 1 week. In New York, of 900 births among 898 women, there was a death rate among the babies under 1 month of age, based on living births, of 19.5 per 1000.²

In carefully kept records of 10,000 consecutive births, the deaths during the first 14 days were 3 per cent. of the living births.³ In confirmation of the statistics from Philadelphia, one finds other statements ⁴ and ⁵ that prove that a large percentage

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of the deaths in babies occurs before the expiration of the first month succeeding birth.

It has been variously estimated that from 60 to 75 per cent. of the infantile deaths under 1 month of age are due to prenatal causes, and much interest has been stimulated in prenatal care⁴ and⁶. Skillful obstetrics is also playing its part in lowering the death rate. But, in combating infant mortality, an increased knowledge of the baby's metabolism and a consequent better understanding of his requirements should aid in postnatal care.

It is not definitely stated just when the human animal ceases to be a "new-born" and enters upon the still unstable career of babyhood. The transition is a gradual one and there is no sharp demarkation. In this paper we shall consider the baby under 1 month of age.

Diseases of the New-born.—There are certain diseases that are peculiar to the new-born. With some of these we are quite familiar and they often present obvious symptoms. Suffice it then to mention in this connection hereditary syphilis which usually presents manifestations before the end of the first month of life; atelectasis; the several varieties of icterus; the acute pyogenic infections of the new-born including ophthalmia and pemphigus; tetanus; sclerema and the hemorrhagic diseases. One should be on the lookout for meningitis, as it occurs in very early life and may have as an etiologic organism the tubercle bacillus, bacillus coli communis, meningococcus, micrococcus catarrhalis, pneumococcus, bacillus mucosus capsulatus, staphylococcus, streptococcus, bacillus pyocyaneus or the bacillus lactis aerogenes.^{7, 8, 9, 10} and¹¹. It is no longer doubtful that tuberculosis may be a congenitally transmitted disease.^{12, 13, 14} and¹⁵.

One is accustomed to thinking of the young baby as immune to the common contagious diseases. While this is true to a large extent, nevertheless diphtheria, scarlet fever, measles, whooping-cough and small-pox *do* occur in the new-born.¹⁷ Diphtheria is a disease uncommon in very young infants but only those infants are insusceptible whose mothers have immunity.¹⁸ and¹⁹. Others are susceptible from birth.²⁰ Scarlet fever has been reported in a newborn infant.²¹ and^{20a} As to measles, infants under 2 months are usually immune. The immunity is probably conveyed through the placental circulation, only those infants whose mothers have

had the disease seeming to enjoy this immunity.^{22 and 23} Measles has been reported in infants as young as 16 days of age.^{24 and 20b} Whooping-cough has begun as early as the fourth day of life with distinct whooping on the eighth day.^{25, 20c and 26}

Pneumonia, in the first few days of life, is not so uncommon³ and this has been proved by autopsy.²⁷ Pneumonia and pulmonary inflammations at this age have been considered to be infections of umbilical origin.²⁸ Pyelitis may occur in the new-born.²⁹ Gall stones have been found in the new-born at autopsy.³⁰ Polycystic kidney is reported in the very young infant.³¹ The appendix has been successfully removed from an infant 12 hours after birth.³²

Thus it is evident that not only must the new-born infant combat certain diseases that belong to his time of life, but he is also occasionally liable to diseases that commonly affect older children.^{20d, 25a, 33, 34, 35 and 36}

Physiology of the Gastrointestinal Canal.—Saliva is probably secreted during the first day of life and has the power of converting starch into sugar at this time.^{37 and 38}

At birth the stomach has a capacity of 1.2 ounces, which has increased to 1.5 ounces at the end of the first month. The gastric capacity, as measured postmortem, is a false guide. The quantity of milk given may exceed the measured gastric capacity by a considerable margin.³⁹ That is to say, the physiologic capacity is greater than the anatomic capacity, because the food begins to leave the stomach almost as soon as it enters it. Hunger contractions in babies up to a month of age begin about 2 hours after the last meal, and reach their maximum in three hours.⁴⁰ The stomach should be empty in 3 hours and frequently is empty in less than this time.⁴¹ With breast fed infants, of less than a week of age, the stomach is often empty in an hour.⁴²

The new-born, as well as other babies, should be held erect for a short time after feeding.⁴³ Free hydrochloric acid is present in the stomach at birth or soon thereafter.^{42, 44 and 45} The acidity of the infant's stomach of the first month remains nearly stationary during the first hour after a meal, after which it rises steadily until the next meal, and if this is delayed 4 hours the acidity may become as great as in the adult's stomach (0.005), measured by means of hydrogen electrodes.⁴⁶ The stomach at birth contains

pepsin, rennin and lipase.^{45 and 47} While the concentration of hydrochloric acid in the stomach of the new-born is sufficient for the action of the ferments, lipase and rennin, there is some doubt as to whether it is in enough concentration for the action of pepsin.

The pancreatic ferments, trypsin, amylase and steapsin, are present at birth. Secretin, enterokinase, invertin, lactase, maltase and erepsin have also been found in the intestinal secretions of the new-born. Bile begins to flow during the first 12 hours after birth, and after a few days there is a marked increase in the volume secreted.^{48 and 49}

The new-born is required to digest and assimilate fat, sugar and protein, and it is seen that under normal conditions he has the necessary ferments present in his gastrointestinal canal to assist in preparing these food elements for absorption.

Bacteriology of the Gastrointestinal Canal^{34, 35 and 50.}—There is a practically sterile condition of the gastrointestinal tract in the new-born at birth. The meconium is sterile and bacteria do not make their appearance in the intestinal discharges until 18 to 24 hours after birth.⁴⁶ Soon after birth, a few bacteria are found in the mouth. Bacteria also quickly enter by the rectal route and the second day after birth may be found in all parts of the intestinal tract.

Urine^{25b and 51.}—During the first few days of life, the new-born passes but little urine. The amount of urine voided during the first and second day is about 50 c.c. After this, there is a rapid increase to 200 c.c. and this amount, or more, is normally passed by the tenth day.^{33a} There is usually some urine in the bladder at birth. This does not contain albumin but after this, for the first four days of life, there is an excretion of albumin in the urine. Immediately after birth, the urine is clear. It then becomes cloudy for the next 4 or 5 days, and the sediment shows epithelial cells, leucocytes, hyaline and epithelial casts and amorphous hyaline substance. A brick red sediment appears in the urine on the second to the fourth day, which consists of ammonium urate. A condition of uric acid infarction is normal in the kidney of the new-born, and this accounts for the ammonium urate. Uric acid excretion in the urine of children during the first days of life is both relatively and absolutely high. It reaches its maximum of 0.083 gm. on the third day.^{52, 53 and 54} The

urinary excretion of phosphorus is also high during the first 3 days of life.⁵³ New-born infants excrete oxalic acid in the urine in varying amounts up to 9 mg. per day.⁵⁵ Contrary to the earlier findings, phenol is quantitatively present in the urine of every new-born infant, the average being about 11 mg. for the first 3 days of life.⁵⁶ The urine of the normal new-born is nearly always acid. It takes on an average 1.7 gm. of sodium bicarbonate to turn the urine from an acid to an alkaline reaction, giving 0.16 gm. every two hours by mouth.⁵⁷ Infants as young as 3 weeks of age eliminate about the same percentage of phenolsulphonephthalein as adults (47.7 per cent. at the end of the first hour and a total of 69.4 at the end of the 2 hour period⁵⁸).

Blood.—It has been pointed out that much of the work which has been reported as examination of the blood in the new-born, has in reality been analysis of the blood taken from the cord at birth, and as such represents rather the fetal condition than that of the new-born.⁵¹

The blood of the new-born is richer at birth in corpuscles and hemoglobin than the adult. A count of over 6,000,000 red blood cells, or 30,000 white blood cells is not to be considered abnormal. This increase is only apparent and is easily explained by the variation in the quantity of blood plasma.⁵⁹ All these changes are marked up to the fourth day after birth and then gradually approach the adult type.^{25c} The hemoglobin has been carefully studied by the spectrophotometric method and shows that during the first 2 weeks of life the normal hemoglobin content is 30 per cent. greater than in the normal adult.⁶⁰

Blood sugar has been investigated and the reduction power of the blood in the new-born has been found to be essentially the same as in the adult or in older children. In 93 observations on 12 infants from the first to the ninth day of life the average was 0.0878 gm. of sugar per 100 c.c. of blood.⁶¹

At birth there are 3.0 mg. of uric acid per 100 gm. of blood. This rises to a maximum of 3.9 mg. by the third day. The blood uric acid then falls off slowly to 2.9 mg. on the fifth day, and then rapidly to 1.6 mg. by the eighth to eleventh day.⁶²

In 9 cases in which the fat from the umbilical vein was examined there was a variation of from 0.14 per cent. to 0.49 per cent. with an average of 0.27 per cent.⁶³

The total non-protein nitrogen per 100 c.c. of the systemic blood in the new-born is 24 to 30 mg. (approximately the same as in the adult). The age and weight of the infant and the period after feeding have no bearing. The percentage of urea nitrogen is uniformly high and averages about 50 per cent. of the total nitrogen. It is lowest in the new-born infant one-half hour old and in infants who have not been fed. The amount of urea nitrogen is extremely small. Aminoacids are constantly present in appreciable amounts even when no feeding has as yet been given.⁶⁴ and ⁶⁵. The mono-amino-acid-nitrogen in the blood taken from the umbilical vein at the moment of birth varies from 9.5 to 15.8 mg. per 100 c.c. of blood.⁶³ and ⁶⁶

The total creatinin in the plasma of fetal blood is 1.93 mg., and reformed creatinin 1.07 mg.⁶⁷

Metabolism of the New-born.—The knowledge so far gained about the metabolism of the new-born is not hard to understand provided one starts with certain facts and definitions in mind. Much that we know about this subject is due to the splendid studies of Benedict and Talbot.⁶⁸ and ⁶⁹

Basal metabolism is taken when there is a complete absence of extraneous muscular activity (i. e. during sleep, and an absence of the heat elimination incidental to the specific stimuli of the food materials accompanying the digestion and absorption of food (i. e. when the stomach is empty)⁶⁸, ⁶⁹ and ⁷⁰. Indirect calorimetry is using the respiratory exchange to compute the total calorimetry.⁶⁹ The respiratory quotient means the volume of carbon dioxid expired, divided by the volume of oxygen used. "When pure carbohydrate is burned up outside the body the volume of oxygen necessary for its combustion is always the same as the volume of carbon dioxid given off as a result of the combustion.

The respiratory quotient of carbohydrate $\frac{\text{CO}_2}{\text{O}_2}$ is, therefore, always 1.00. The respiratory quotient of fat is 0.713, and of protein 0.801.⁷⁶ An extremely simple method for calculating the catabolism is to multiply the total amount of carbon or oxygen measured by the corresponding calorific equivalent.⁶⁹ With a knowledge of these facts the infant has been studied in a calorimeter, and energy requirements ascertained.

It will be well to give the formulas used for calculating the

body surface. The first is that of Meeh⁷¹ in which the equation given is $\text{body surface} = 11.9^{2/3} \sqrt[3]{\text{Weight}}$. Lissauer's formula⁷² is better for use in babies and is as follows: $\text{body surface} = 10.3 \sqrt[3]{\text{Weight}}$.

The gaseous metabolism of the new-born studied in the calorimeter has shown certain facts of interest and practical value. The respiratory quotient for the new-born indicates that the child is born with a supply of carbohydrate sufficient only for its energy requirements for a portion of the first day. A new-born infant requires about 60 calories per kilogram of body weight per 24 hours and the energy quotient varies in individual cases from 40 to 75 calories.^{70 and 73} The total calories of the basal metabolism of a new-born infant may be calculated from the following formula: $\text{length} \times 12.65 \times \text{body surface}$.⁷⁶ This is the basal metabolism and the actual calories required in the food are about twice those of the basal metabolism as allowance must be made for the calories lost in excreta, those used for growth and those required for muscular activity and crying.⁷⁴ The infant needs more calories per unit of body weight than does the adult. For example, the energy production of a grown person in health and while resting in bed is 1.0 calory per kilogram of body weight per hour. An infant of 10 days old, while sleeping, has an energy metabolism of 2.0 calories per kilogram of body weight per hour.⁶³ Benedict and Talbot hold that there is no intimate relation between body surface and fundamental metabolism but that the determining factor is the active protoplasmic mass.⁶⁸

It is apparent, therefore, that infants, at least during the first 10 days of life, do not require the 100 calories per kilogram of body weight which older writers have claimed were necessary. In this connection it is important to note how much nourishment the baby would get provided the colostrum were depended upon as the sole source of food intake. The figures given by various authors vary to a certain extent^{70 and 73} but it is quite certain that the calorific value of colostrum is insufficient to supply the needs of the new-born infant. During the first 24 hours there is secreted 4 to 6 c.c. of colostrum, giving approximately $3\frac{1}{2}$ calories. During the second day, the baby receives from 78 to 129 c.c., or 51 to 84 calories. On the third day, the amount of colostrum varies between 199 and 238 c.c., which give 129 to 154 calories.⁷⁰ After this time the breast milk increases in quantity so

by the tenth day 400 to 500 c.c. are being secreted.⁷³ At the same time the secretion becomes richer in fat and sugar.^{20e}

Before discussing the feeding of the new-born it is necessary to consider the question of the initial loss of weight which occurs after birth. This loss of weight, occurring in the first 3 days, is about 8-9 per cent. of the total body weight, and varies from 100 to 300 grams.^{73, 75 and 76}

A loss of weight of more than 500 grams or a continuation of loss over a period of more than 4 days is an abnormal condition.⁷⁷ Loss of weight in the new-born is of 2 kinds, mechanical and physiological.⁷⁰ The mechanical loss is caused by the passage of meconium and urine, the vomiting of allantoic fluid, the removal of the vernix caseosa and the evaporation of water from the skin. The physiologic loss is to be attributed to an insufficiency of the entire metabolism, especially the water metabolism,⁷⁸ and is the most important cause of loss of weight in the new-born.⁷⁵ The water lost from the child's body has been measured and found to be 28.12 grams per kilogram of body weight for the first 12 hours, and 40.74 and 53.6 grams per kilogram of body weight, respectively, for the next two 24 hour periods.⁷⁹ The water content of the blood of the new-born has been compared to that of older children. In 9 babies, from the first to the thirteenth day of life, 22.3 per cent. of dry substance and 77.7 per cent. of water was found in the blood, whereas in 9 babies from 1 to 10 months of age the dry substance was only 18 per cent. and the water 82 per cent.⁵⁹ It is then quite well established that the water concentration of the blood runs parallel to the weight curve.⁸⁰

In deciding whether or not an infant should be fed in the first few days of life, these facts are to be taken into consideration: the new-born infant requires 60 calories per kilogram of weight per 24 hours; in the secretion from the breast he receives only a fraction of such an amount (not enough to supply the energy requirements for combustion alone); there is considerable loss of water from the child's body and a consequent concentration of the blood; the higher the percentage of water the easier are the processes of metabolism; when the glycogen in the liver and tissues has been used up (as it is within a few hours after birth) it is necessary for the baby to use its own tissues to supply energy. Although it is certain that the mechanical loss of weight cannot entirely be prevented, it seems logical, in view of these facts, to supply the new-born either with water or easily digestible food

of some calorific value. In spite of this, some authors advocate giving nothing until the breast milk comes in and believe that artificial feeding at this time prolongs and increases the weight loss.⁷⁸ Again it has been stated that there is no relation between the nature of the feeding and the grade of development of initial loss of weight,⁷⁷ and that the giving of water does not seem to have effect except in cases where practically no milk is secreted.⁷³ It has also been used as an argument against artificially feeding new-borns that the digestive processes are but feebly developed and that it is only the fat and serum albumin of colostrum which are closely related to those to which the infant has been accustomed in intra-uterine life.⁷⁸ The giving of 50 calories per kilogram of body weight per day in formula feedings and diminishing this as the breast milk comes in, has been practiced.⁷⁵ The feeding of cow's milk at such an early age, however, means introducing a foreign protein, which may be absorbed directly into the blood, and the best procedure is to give breast milk from a healthy woman which has been diluted with boiled water.^{70 and 76} Failing this, 5 per cent. lactose solution should be used.⁷⁰ The weaker and smaller the infant the more the necessity for early feeding.

Some of the problems that concern us in older babies and children are not of such first importance in the new-born. For example, if the young baby is to be nourished on human or cow's milk it is not necessary to consider the "vitamins" or growth promoting substances which are perhaps better called fat-soluble A and water-soluble B.⁸¹ These substances are contained in both human and cow's milk in sufficient quantity.

All these studies in physiology and metabolism have resulted in helping us to understand the infant's requirements and the various factors related to nutrition. It is well to remember what Mendel says: "However essential food may be to growth—and no one can gainsay its pre-eminent importance—it can in no sense be regarded as the supreme cause of growth. Nutrition can only give the growth impulse free play. Of what we have called the internal factor in growth—the growth impulse, the tendency to grow, the capacity to grow—the factor that is hereditary in its origin and sets to growth the limits which nutrition cannot fundamentally alter, little further can be said."⁸² This should not deter us, however, from doing our utmost to understand, and meet the requirements of the new-born infant.

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HEALTH CLASSES FOR CHILDREN.*

By IRA S. WILE, M.D.

New York.

The trend of modern medicine into prophylactic ways is manifested in numerous institutions and agencies designed to protect childhood. By a strange process of reasoning, or possibly because of the ease of accomplishment, efforts at the protection of childhood began with children in industry. Following upon this, school medical inspection was inaugurated, later supplemented by the advent of the school nurses. The next step was the establishment of a practical and serviceable system of infant milk stations, which evolved into infant welfare centers. As a natural outgrowth of efforts in this direction, interest was focused upon problems of pre-natal care, out of which has grown the plan of maternity centers, and pre-natal clinics. Incidentally, it may be remarked that the term pre-natal care, as applies to the oversight of pregnant women, is not sufficiently inclusive. With the development of this systematic plan of oversight and protection from conception to the age of employment, there exists one gap which merits attention. Insufficient provision exists for the health care of children during the pre-school age, which, in view of potential agencies, represents the span of years between the cessation of efforts of the infants welfare stations and the beginning of school medical inspection. From the standpoint of disease, this period might well have been left until the last, but there remains the obvious fact that it presents a marked opportunity for constructive service.

The pre-school age requires some organized system of health supervision so as to preserve the continuity of educational and protective service from infancy to the period of school life. It is patent that during these years it is possible to accomplish a marked saving of health, and a reduction in the development of defects and handicaps. Furthermore, considerable economic gain results from the earlier attention to errors in development and to defects acquired during the pre-school age, instead of waiting several years until the costly machinery of school medical inspection is set in motion. Another advantage of health work during the pre-

* Read before the New York Academy of Medicine, Section on Pediatrics, December 11, 1919.

school age arises in and from the educational advantages that ensue from the possibility of classifying children physically and mentally previous to their entrance upon school work. In many ways the opportunities for service are of greater moment between the ages of 2 and 6 than between the years of 6 and 14. It is for these various reasons that I believe that the establishment of health classes is particularly desirable in the plan for conserving child health during the pre-school age.

The health class presents the possibility of communal service along various lines. While preëminently dealing with children, its benefits extend to families as a whole, and inure to the welfare of the general public. It is an agency for general family adjustment in the matters relating to childhood. On the physical side its efforts are preventive as well as remedial. It possesses a vantage point for the prevention of tuberculosis, cardiac diseases and the development of defects of sight and hearing, as well as the correction of postural errors, and incipient deformities of the feet and spine. In a remedial way, it eliminates or palliates dietetic errors and lessens the likelihood of malnutrition affecting other children in the household. By reason of the early detection of visual, oral, nasal, pharyngeal and other defects, early correction becomes possible with a consequent improvement in the general physical health of childhood, and with a corresponding gain in vitality and resistance.

The mental hygiene of childhood merits considerably more attention than has been given in the ordinary run of clinics. The health classes, however, should aim to investigate mentality, to ascertain the intelligence quotient, to test the channels of sensation, to localize and define the mental limitations with a view to instituting the requisite educational or therapeutic measures necessary to secure the maximum mental development as a preliminary to attendance at school. By this means it is possible to provide sufficient information to fix the place of a child in the school system and to lessen the wastage of time, effort and nervous force due to maladjustment in school grading.

The moral aspects of health classes involve the formation of moral habits through the gain in powers of self control and inhibition. The moral gains secured through the control of lispings, biting nails and pica, are by no means secondary to those resulting from overcoming masturbation.

A social aspect of a health class is found in the attempt to deal justly with childhood, the presentation of an opportunity of achieving health despite the incubus of poverty and ignorance. The awakening of a sense of responsibility for maintaining health and the arousing of a consciousness of the worth of health during childhood serve as points of positive advantage over the mere teaching of hygiene. The social benefits center around personal experience and the recognition of the personal gain during and through the pursuit of a higher coefficient of energy, mental power, and moral control.

Health classes, to function properly, should be articulated with a general dispensary or hospital, the home, and various agencies which can supplement and augment the work of the class. To provide for these articulations, it is essential to have a social service nurse and one or more friendly visitors who can correlate the various activities and agencies. It is patent that the physicians in the various other departments of dispensaries may at times have their reports coordinated by the physician in charge of the health class, so that the benefits of group diagnosis are achieved, without any unnecessary disturbance of dispensary routine.

The form of organization which I am using at the health class at Mt. Sinai Hospital Dispensary is in a state of development and does not yet contain all the elements I deem necessary. At present we have a volunteer capable of taking histories and through whose hands each new patient passes. The number of new patients per day is limited to from 5 to 10 children, depending upon the number of physicians in attendance.




A social service nurse devotes her entire time to the health class, and during consultation hours attends to the weighing and measuring of the children and gives such other aid as circumstances require. She secures the directions for treatment and instructions from the physicians, visits the homes to see that advice is followed, makes the necessary social investigations, and keeps the reports essential for the following up of the progress of the family.

The doctors make the regular physical examination of the children, largely in the nature of a complete physical examination. Whenever particular defects are noted that require special investigation, they refer the children to other dispensary depart-

ments for examination and report or to institutions for the special corrections indicated. Children acutely ill are not treated, but are referred to the pediatric or other departments for therapeutic attention. At present the mental problems are handled by myself, and the cooperation of the nurses and parents is secured in the interest of the children's mental development.

Two agencies which are not in existence but are under consideration and I trust will soon become active are a clinical psychologist and a teacher of domestic sciences and arts. Mental examinations require so much time and careful study, that it is preferable to have a clinical psychologist devote himself to this phase of the work under the direction of the chief of the class, rather than to lessen the effectiveness of the physician in the management of the regular group of children demanding his care.

WEIGHT CHART

WEIGHT	NO.	
LOST	1	
STATIONARY	2	
GAINED	97	

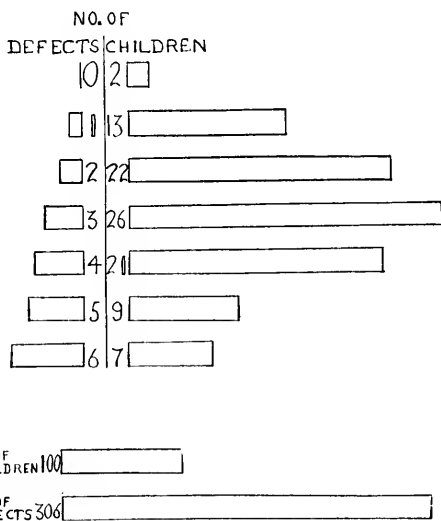
With the report of the clinical psychologist in hand, it is possible to cooperate through discussion concerning the needs of individual children, to lay out a rational program for their development, and to institute the measures of mental hygiene deemed necessary for the protection and advancement of the children.

In as much as I regard the family as the focal unit for health work with children, it is necessary to have some one capable of assisting in raising home standards. The knowledge and experience of social service nurses, broad as they may be, are insufficient to enable them to deal satisfactorily with many home problems. For this reason a teacher of domestic sciences and arts is almost a necessity. In addition to her particularized work with the home, it is designed to arrange for various classes for mothers and older children, with a view to instilling a working knowledge concerning the numerous phases of home making that are so

intimately related with familial health. Our experience has demonstrated the willingness of parents to cooperate and their sincere desire to improve their manner of home making in consonance with the principles of hygiene and health.

By enlisting the services of a few socially minded persons to serve as friendly visitors to assist in transporting children to various clinics or social agencies, considerable advantage is gained, family morale is raised, and the certainty of appointments being kept is assured.

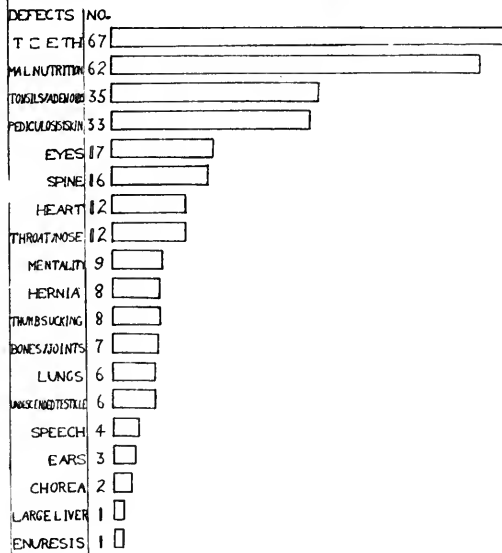
NUMBER OF DEFECTS PER CHILD



This type of organization may appear to be too elaborate, but it represents my conception of an effective scheme of health class administration, providing that one person is responsible for the working out of all plans and policies. To bring about a coordination of ideas and to encourage the enthusiasm for the work, occasional meetings of the administrative group should be held for the purpose of discussing results, criticising weaknesses, and elaborating the plans in the light of multiple experiences. The group of workers must function as a whole or the class fails to reap the greatest benefits.

When it becomes necessary to make specific investigations into particular defects, the child is referred to the proper department, but after a report is received, even though special treatment be instituted, the child returns to the health class. Rarely is it necessary to relegate a youngster to a special class for the relief of malnutrition, for cardiac care, or supervision, or for anti-tuberculosis hygiene. As a matter of psychology, I believe it to be disadvantageous to segregate children in classes designed to treat specific deficiencies. In the first place, it tends to focus the

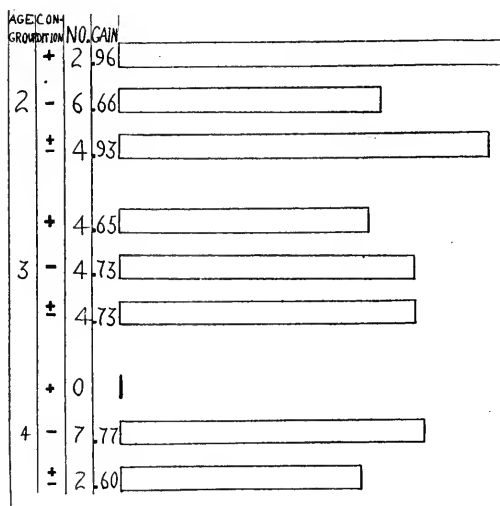
FREQUENCY OF DEFECTS NOTED IN 100 CHILDREN



child's attention too much on its own ailment, and secondly, it helps to create a sense of inferiority, both of which are undesirable. By centering the attention upon the health aspects of the class, the subsidiary examinations are considered as part of the general investigation, and the necessity for subdividing attention becomes less imperative. There are of course exceptions to this rule, as for example, when it is necessary to send a child to a calisthenic class in order to create proper postural habits or develop muscles functioning improperly. Even under these circumstances, however, the child reports back to the health class with regularity.

A large measure of our efforts is along educational lines. To this end, use is made of posters, booklets, lectures, demonstrations, and exhibits of various kinds, to illustrate the important phases of health and hygiene. The educational message is delivered at the class and supplemented by instruction in the home. Teaching is personal and in groups, but always with the idea of the building up of family health, as well as with the aim of securing the physical betterment of the individual children belonging to the group. We have established a certain amount of competition among mothers by having 3 types of admission cards, indicating 3 relative degrees of proficiency in carrying out the instructions

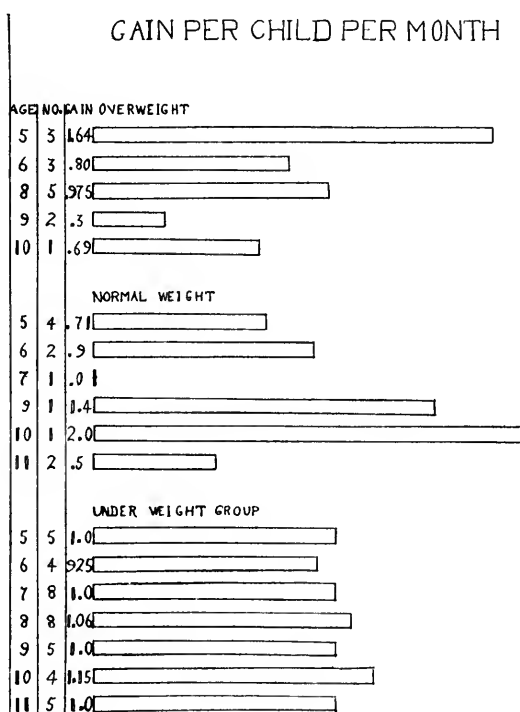
GAIN PER MONTH PER CHILD



given, and in cooperating towards a higher standard of health habits and methods of living. Mothers are promoted and their own efforts determine the rating deserved. The children bear witness to the progress under home direction and more especially maternal supervision.

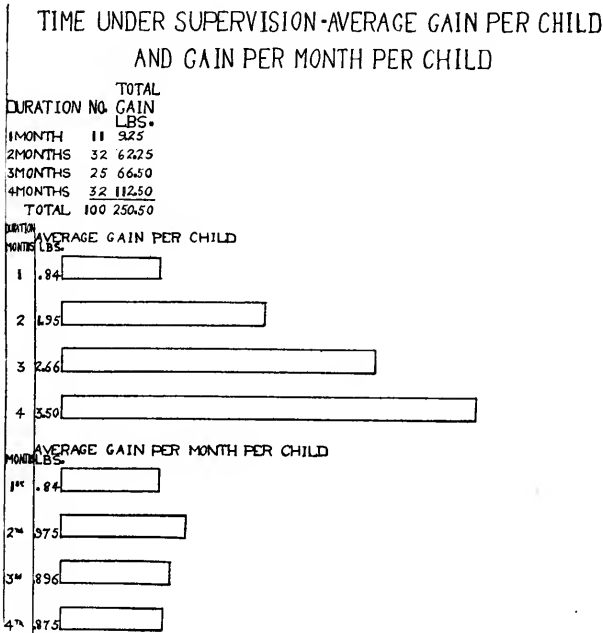
The visitor is particularly struck by the fact that the health class possesses an atmosphere peculiarly its own and unlike that found in an ordinary clinic. The waiting room is not a place of rigid discipline and formality, but abounds in cheerfulness and activity. Adults and children are free to move about as they

please and are encouraged to interest themselves in the work going on, to study the educational material available, to compare gains in weight, to note the progress of other children, and to acquire the point of view that health is an asset worth achieving. A sense of beauty and joy is fostered through an ample provision of books, games, toys, rocking horses, a blackboard and the like, for the use of the children. Tears are avoided or banished and



the tone of a house of childhood predominates. As a result, there is a feeling of friendliness and mutual interest which merges into a spirit of cooperation and mutual assistance. Not merely do adults aid with their children, but elder children willingly assume responsibility for the correction and re-education of their younger brothers and sisters. The humanizing element is essential in order to create the idea that the health class possesses a high value and an attraction that makes it a real factor in promoting familial health and morale.

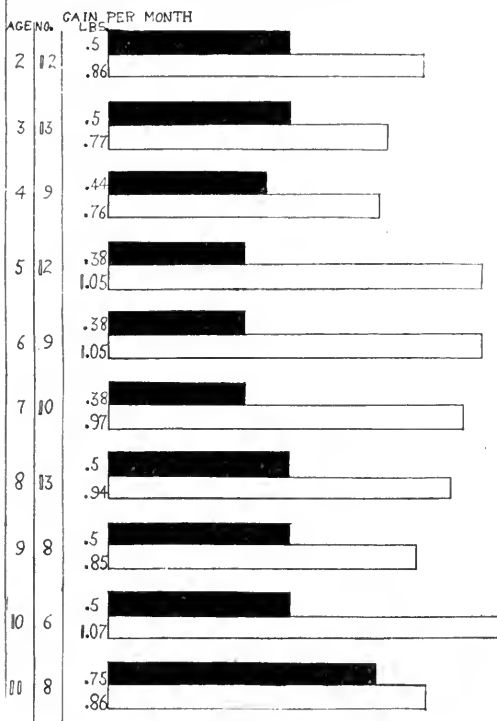
It is scarcely necessary to point out to this group the necessity for health classes, or to dwell upon the physical benefits to be derived from their further development. They represent an advance in health administration only in so far as they may be regarded as the legitimate extension of the activities begun at Infant Welfare Stations. They possess an added advantage in that they impress the child's mind directly as well as indirectly, and arouse a personal interest that is impossible during infancy. They possess another valuable feature in that they serve to lessen



the fear of children for physicians and reveal the profession to them as interested in their health and happiness as well as in their diseases and the distresses occasioning pain and discomfort. Furthermore, it represents a further penetration of the wedge opening up the common mind to the advantages of repeated physical examination when no recognizable invasion of disease exists. The educational advantages are self evident and the opportunities for promoting a rational plan of mental hygiene are plain.

The question as to tangible results may properly be raised and in order to bring these out clearly I have prepared certain charts indicative of the statistical facts which will demonstrate some of the benefits derived. It is impossible, however, to interpret gains in weight in terms of gain in mental power. The bare statistical statement of defects noted and corrected affords no measure of the improvement of mind and soul, any more than

THEORETICAL VS. ACTUAL GAIN PER CHILD PER MONTH



it can serve as an index of the gain in muscular power. For this reason I am presenting few tabulations because I realize that while mathematically correct they afford little information regarding the actual improvement in the physical, mental, and moral welfare of the children and their families. To calculate the number of children cured of nail-biting or lisping, or to enumerate in bulk the number of mental defectives who have been studied and directed gives no information regarding the complete results aris-

ing from better self control or the enthusiasm which has been developed for work within the range of mental possibility.

A long period of time must elapse before one can judge the social benefits that accrue as a result of health classes. This much, however, is certain—no agency possesses greater potentialities along physical, mental, and moral lines than health classes for children. Their aims and methods are distinctly social and seek to offer justice to childhood despite the difficulties of hereditary or environmental origin. Their machinery is simple, their methods rational, their service direct, and their results powerful for bettering and strengthening the lives of children and potential citizens. The plan should commend itself to those grappling with the problems of Americanization, as one effective approach to this difficult problem.

264 West 73rd Street.

OPERATION FOR DIAPHRAGMATIC HERNIA (Paris Médical, Aug. 30, 1919). A. Schwartz and J. Quénu have been making a special study of the best technic for correcting diaphragmatic hernia, and they expatiate on the advantages of an incision in the seventh interspace, starting at the axillary line and continued down to the umbilicus. There is no need for rib resection. The incision is carried down deep enough to open the pleura and peritoneum. The cartilaginous margin of the thorax, to which the diaphragm is attached, is cut with scissors, and the incision resulting is continued in a straight line in the diaphragm to the hernia opening. Both the thorax and the abdomen are thus opened up. The organs that protrude into the thorax are readily recognized and reduced, the diaphragm sutured, the cartilage reconstructed and a drain left in the pleura if adhesions had to be broken up. The only drawback to this technic is the operative pneumothorax, but this is regarded as of not much moment nowadays. The article is illustrated.—*Journal A. M. A.*

AN INFANT HYGIENE CAMPAIGN OF THE SECOND CENTURY.*

By JOHN FOOTE, M.D.,

Washington, D. C.

Much has been written concerning the degeneracy of Roman civilization and the brutal indifference displayed by the civilized, but not humanized, nations of antiquity in their treatment of the newborn. There is abundant evidence in Roman literature of the prevalence of the custom of exposure of infants and of abandonment and infanticide. Plautus and Terence made merry with this theme in more than one comedy, and many of the "modern" cynical quips on matrimony unquestionably have come down from the later days of the Roman Republic when, as Seneca says, "some women reckoned their years by their husbands." And yet—there is another side to this story of which we have heard very little—the side which deals with the efforts made by thoughtful men and women of that day to put an end to practices which they realized must eventually sap the foundations of national virility and which in the second century A. D. crystallized into what seems to this writer, at least, as a more than sporadic effort to teach the lessons of infant hygiene to the general public.

We learned in our primary schools that the legendary Romulus was himself an exposed infant who had been suckled by a wolf. To increase his warlike subjects when he became ruler he obliged his people to bring up all male children, except those deformed and crippled, and also the first born of all females. But there was also a human note in this decree, for even the crippled could not be exposed unless 5 neighbors gave approval.

The word proletariat, so much used nowadays, had a specific application in its original meaning: the *proletariat* consisted of citizens who had no property, but who were valuable to the State through the children which they produced. In the Rome of Augustus, corruption of morals, with the consequent inroads upon the legitimate population of the great world-metropolis, caused that astute ruler to give early attention to legislation regulating marriage and celibacy—the "*lex Julia et Papia*." In the old Rome of the *patria potestas*, the father had the power of life or death

* Read before the American Child Hygiene Association at the Tenth Annual Meeting in Asheville, N. C., Nov. 11-13, 1919.

over his children; now, however, the mere possession or non-possession of offspring determined a man's legal rights. A married man with no children could only take half of an inheritance. In the holding of certain offices the candidate who had the most children was given preference. All personal taxes were remitted to Roman citizens who had 3 children. Citizens who lived in Italy enjoyed this privilege if they had 4 children and those who lived in the provinces if they had 5.¹

These laws remained at least partly in force, despite the changes of Caracalla and Constantine, until their abrogation by Justinian. Augustus also set aside a reward of 2000 sesterces (about \$40.00) for anybody who would bring up an orphan. From the death of Augustus, 14 A. D., to the accession of Nerva, 96 A. D., little social progress obtained amidst the political and military turmoil of Rome. But from the time of Nerva to the passing of the Antonine Emperors, such advances were made as to emphatically warrant the assumption that child welfare of a primitive kind was being propagated in Rome during the second century. Nerva tried to put a stop to infant abandonment by having the State subsidize poor parents (97 A. D.). Three years later, 5000 children were receiving state aid. A coin shows the emperor seated in a chair dispensing charity to a boy and girl, with the inscription, "*Tutela Italia.*" Trajan loaned money to land owners, the interest of which was used to support parentless or abandoned children.

Hadrian, who had Plutarch as a master and Suetonius for a secretary, and who was himself a tremendous student and a great traveler, might be expected to have enlightened and liberal views in spite of his imperial absolutism. "Here in the second century we see an emperor," Duruy says, "employing logic in the service of humanity." For he ruled that any woman who had been free at the time of pregnancy must as a result give birth to a free child. Women were allowed to make wills and inherit rights in the property of sons who died intestate. Carthaginian priests had been forbidden by Tiberius to offer children in sacrifice to Moloch; this law was repeated and enforced by Hadrian.

The right of the Roman father to kill his own son was abrogated—Hadrian banishing a father who had done this. The reign of law as interpreted by jurists began with this emperor.

¹ "The Child in Human Progress," G. H. Paine, New York, 1916, pp. 227, et seq.

Antonius Pius extended throughout Italy the loan system of Nerva, the large income derived therefrom being devoted to the care of abandoned children. An institution for the care of female orphans, heretofore exposed without scruple, was founded in honor of his wife Faustina, the "*puellae alimentariae Faustinae*." A medal shows on one side Faustina and on the obverse Antonius surrounded by children and inscribed "*Puellae Faustinae*."²

This work was continued and amplified by the great philosophic emperor, Marcus Aurelius. But not only were these passive measures employed to prevent destruction of child life, but books were written bearing on the problems of the care of the child and the importance of rearing healthy offspring—to spread the propaganda of infant care.

It was during the reign of Trajan, between 110 A. D. and 130 A. D., that Rome became the home of the greatest obstetrician and pediatrician of antiquity—Soranus of Ephesus. This wonderful physician was the most illustrious of the school of Methodists, founded by Asklepiades—but he was too great to be bounded by the limitations of any narrow cult. He was probably educated in Alexandria, but he came from a highly civilized region of Asia Minor which had flourished under Grecian influences for many generations, although today little remains but a memory of the name of its beautiful city—Ephesus. The obstetrics of that day was practiced by midwives, usually slaves. In difficult or important cases, the physician was called. In the work of Soranus, it is obvious that the directions for the care of the child were written for use by the nurse or the mother, and that this was to a certain degree a popular treatise similar to the "baby books" of today. Translations and commentaries on Soranus have been made in Latin, German and Russian; Lieutenant Colonel Fielding Garrison, in an abstract not as yet published, was probably the first to summarize the pediatrics of the Ephesian physician in English.

At the XI International Medical Congress in Rome, (1895), I. V. Troitski, writing in Russian, compared in parallel columns the practice of Soranus of the second century with the teachings of authorities of the late nineteenth century, an interesting document, which, through the assistance of Mr. J. H. Ohsol, of Washington, I am enabled to study carefully.³

² Ibid I, p. 248

³ Soranus Ephesusus," I. V. Troitski, Kiev, 1895. (In Russian).

Anyone who examines Soranus's work on pediatrics, even without its commentaries, will scarcely doubt that the Roman physician wrote the most modern work on infant nursing that appeared up to a century ago. The changes in modern nursing care would be surprisingly few, if we excluded the innovations due to our knowledge of antiseptics, while the practical instruction is so sound, that with some editing and the abandonment of swaddling and wet nursing, Soranus's textbook could be used in the education of the nurse or mother certainly to greater advantage than any work of a similar kind written up to the time of Underwood.

Beginning with the twenty-sixth chapter of his book,⁴ Soranus tells how to determine the strength and vitality of the newborn, by its cry and its appearance. The method of tying the umbilical cord is next considered. He shows splendid surgical sense in his directions, warning against the use of dull instruments and lacerating methods. He tells how to care for the skin of the newborn, and dismisses several faulty methods of the past. Swaddling he thinks necessary to keep the infant's limbs straight, yet he cautions against certain vicious practices in connection with this custom, gives each procedure in great detail, and insists on cleanliness. The bedding and bedroom of the newborn next claim his attention, and he insists on a soft mattress filled with grass or linden fluff, again frequent changes of clothing and absence of bad odors.

The feeding of the infant forms an extensive chapter. Soranus declaims against giving foreign food to the newborn. No food is needed for 3 days, he says. Possibly a little honey may be given with water, but nothing else. As most of the obstetrics of that day was performed by midwives there was much hemorrhage and many infections in childbirth. "Milk under these conditions is bad," says Soranus, "so it is best to secure a wet nurse for the first few weeks." He believes in wet nurses—"it saves the mother for future childbearing," he says, "and also saves her beauty." Slaves were most frequently used for this purpose. Soranus does not say that wet-nursing is the best practice—but that it is the most expedient. Of course only the wealthy employed physicians and only the very wealthy an obstetrician.

⁴ "Sorani Gynaeciorum," ed. Valentine Rose, pp. 248, 292 cap. XXVI—XLII, Greek text, Liepsic, 1882.

Soranus unquestionably had a wealthy clientele, for he advises not one wet nurse, but 2 or 3, in case one should be taken ill.

He tells very explicitly what kind of a woman to choose as a wet nurse, how she should qualify physically and mentally. "The essential mental qualities of a good nurse," he says, "are patience, common sense, good nature or gentleness and neatness." No one before or since has written more intelligently or more exhaustively on this subject.

To judge of the quality of the nurse's milk he gives several tests. "Do not judge the milk simply by a poor appearance of the infant," he says, "for the milk may be of the best, and the infant have some disease which prevents proper nutrition." To test the milk he gives information as to its proper color, its odor, its consistency. Its density is established by mixing it with water and observing its behavior. He describes the taste of normal human milk and how it should act when exposed to the air. Its behavior when shaken, and the appearance and persistence of air bubbles furnishes another index to its density. Also when a drop of milk is placed on the finger nail it should not run off quickly, nor change its shape when the finger is shaken moderately, but it should do so when the hand is shaken rapidly. "When milk proves satisfactory under these tests, even when the mother is not on a proper diet, it is very good milk," says Soranus. Crude as these tests were, they were valuable, and practical, and showed what a careful, reasonable observer Soranus must have been.

He not only prescribed a rational diet for the nursing woman, but also special exercises. The influence of indigestion on the quality of milk is known and emphasized by him. He warns against excessive use of wine by the nurse, and dissipation, generally, he condemns. The technic of breast feeding is next taken up, conditions when the nurse should not nurse the child, the proper position for nurse and infant, etc. "Feeding at irregular intervals and often during the day and especially during the night may be the cause of sickness in the infant." Soranus emphasizes this by saying that the infant should never be nursed to satiation, nor should the nurse sleep with the infant nor allow the infant to sleep while at the breast. Moderate crying is helpful to the infant as exercise. "Crying," he says, "is not caused by hunger alone. An inconvenient position, pressure of the clothing, irritation of the skin, too much food, excessive heat, colic, and

various diseases may cause crying." He then tells with great patience how to differentiate between the various causes. We have read this same material in our "modern" baby books; it has changed very little.

"Be careful not to move or swing the baby after feeding it—or you will have vomiting," he says; "and if the baby cries after feeding it, do not threaten it or yell at it; caress it, amuse it. Fear is bad for infants."

To increase the quality and quantity of milk he advises a careful examination of the nurse to see if any disease is present. If none is discovered, then the watery milk may be improved by eating concentrated foods such as eggs, goat's milk, flour meal, etc., and drinking less water. Light exercise, singing, discus throwing, deep breathing and massage are also recommended. "All medicines and popular remedies used to increase the quality of milk produced injure the stomach and the digestion of the nurse," he says; continuing, "the use of such medicines is simply injurious."

To correct heavy milk he prescribes baths, lighter food and more liquids.

He tells in great detail how to bathe and clothe the infant. To atone for the inactivity produced by swaddling, Soranus gives a complete system of massage and passive movements, which exercise the infant's muscles. In all of these he is striving to prevent asymmetrical development and deformities of the limbs.

How to care for the umbilical cord, to prevent hernia, when and how to discontinue swaddling, how to teach the baby to sit up and walk, and when and how to wean, are among the things he writes about. He warns against the premature use of starchy foods—"nothing but milk should be given up to the sixth month." Honey is first allowed, later barley soup, then gruel from parched grain, last of all eggs. The change to more solid foods is permissible at $1\frac{1}{2}$ or 2 years. The infant should preferably be weaned in the spring—never in the summer. Partial breast feeding may be continued for $1\frac{1}{2}$ to 2 years.

The fat infant should be given less food; the thin one, more nourishing food. He discusses rational methods of curbing the tendency of some children to overeat and of inducing others, with poor appetites, to eat enough. "If a child becomes ill during weaning," he says "stop weaning at once."

The eruption of teeth is written of briefly. The gums must not be pressed on or bruised at this time. The nurse also should modify her milk by taking less solid food and more water.

Nothing written up to the late eighteenth century has equaled the work of this physician of 1800 years ago in clearness, in sound hygienic sense and in independence of thought. This will be all the more remarkable if we remember that he wrote on a subject that is even today overgrown with unsound tradition.

Soranus did not emphasize but rather approved the custom long established in both Greece and Rome of allowing infants to be nursed by wet nurses rather than their mothers. This course was to him, perhaps, the path of least resistance. He was a Greek and many of the ethnic arguments used later by Gellius did not occur to him. It was better to have infants nursed by healthy slaves than by dissipated mothers—that was probably his real meaning when he said wet-nursing was “more expedient” than maternal feeding.

History cannot trace Soranus after the year 130 A. D. In that same year, Aulus Gellius, noted later as a Roman lawyer and literateur, was born. Gellius spent some time in Greece, and returning to Rome published his *Noctes Atticae*, a series of discourses on language, literature, history, sociology and many other things. The Emperor Antonius Pius, whose reign began in 138 A. D., inaugurated an unprecedented era of peace and happiness in Rome. Conditions were favorable for the diffusion of knowledge and the spread of ideas relating to public welfare, and to the growth of altruism. So when the Greek philosopher Favorinus speaks in the pages of Gellius, he is undoubtedly voicing a positive sentiment concerning the custom of wet nursing that had been growing up in Greece as well as in Rome, in marked contrast to what was believed and practiced even in the time of Soranus. Strangely enough, this speech of a legendary Greek philosopher left a far deeper impress on the later medical literature than the splendid treatise of the historical Greek physician—perhaps because the metaphysical style and empirical method of Gellius appealed more strongly than Soranus' rational aphorisms, to the post-medieval mind. The didactic poem, *La Balia*, written about 1560 by Luigo Tansillo, was a metrical setting in Italian of

this essay.⁵ The same theories were set forth in Scaevole de St. Marthe's Latin didactic poem, "Paedotrophia," published in 1584.⁶ In fact its influence can be seen in most of the early writers on nursing—Bagellardo being one of the very first. Omnibus Ferrarius, of Verona (1577), quotes the lambs and goats-wool incident, as also does John Peachey in his treatise on infant feeding (London, 1596). Jacques Guillemau (1609) says "the mother who nurses her own infant is the complete mother," almost the exact quotation of Gellius.⁷ Van Swieten's "Aphorisms of Boerhave" also shows its influence.⁸ In spite of its praiseworthy purpose and its undoubted influence, the essay was very defective in its physiology. Perhaps it made even better propaganda because of that, but it is not true that milk is simply blood turned white, nor are mental and physical characteristics transmitted by maternal milk. Thus have the microscope and the test tube shattered many a picturesque belief. The disregard shown by the great philosophers, Plato and Aristotle, to the rights of the living child is in marked contrast to the stand of Favorinus on the question of the destruction of the embryo "while it is still in the hands of its artificer nature," which he characterizes a practice "deserving of public detestation and abhorrence." This would seem a strange doctrine for that day—yet it is simply another evidence of a changed sentiment of thinking men and women in their attitude toward the child.

The following is a translation of the Gellius essay, a familiar work to all students of Latin literature:

*"Dissertation of the philosopher Favorinus in which he induced a lady of rank to suckle her child herself, and not to employ nurses."*⁹

"Word was brought to Favorinus, the philosopher, when I was with him, that the wife of one of his disciples had been confined and a son was added to the family of his pupil. 'Let us go,' he said, 'to see the woman and congratulate the father.' The father was a senator and of noble family. All of us who were

⁵ "The Nurse," a poem, translated from the Italian of Luigo Tansillo, by William Roscoe, Liverpool, London, 1798.

⁶ "Paedotrophia," translated from the Latin of Scaevole de St. Marthe, by H. W. Tytler, M.D., London, 1797.

⁷ "Some Seventeenth Century Writings on Diseases of Children," G. Still, in Osler Anniversary Volume, New York, 1919.

⁸ "The Commentaries on the Aphorisms of Herman Boerhave," Van Swieten, translated by Kapton and others, Edinburgh, 1776.

⁹ Noctes Atticae, Aulus Gellius, Lib. xii Cap. i. See also translation by Beloe, London, 1797.

present, followed him to the house and entered with him.' As soon as he had entered, embracing and congratulating the father, he sat down and inquired whether the labor had been long and painful. When he was informed that the young mother, overcome with fatigue, had gone to sleep he began to converse more at ease. 'I have no doubt,' he remarked, 'but that she will suckle her son herself.'

"But when the mother of the lady said that she must spare her daughter and find nurses for the child, that to the pains of childbirth might not be added the toilsome and difficult task of suckling the infant, he replied: 'I entreat you, madam, to allow her to be the sole and entire mother of her own son. For how unnatural it is, how imperfect and half motherly only, to bring forth a child and instantly send him away; to nourish in her own womb, with her own blood, something which she has never seen and then to refuse to support with her own milk the object which she now sees, endowed with life and human attributes, imploring the tender care of a mother.'

"'And do you suppose,' he continued, 'that nature has given bosoms to women only to add to their beauty—more for the sake of ornament than for the purpose of nourishing children. Because some women believe this (and may this be far from you), they unnaturally endeavor to dry up and extinguish that sacred fountain of the body, the natural nourishment of man, with great hazard, turning and corrupting the channel of their milk, lest it should render the distinction of their beauty less marked.

"'They do this with the same insensibility as those who endeavor by the use of quack medicines and in other ways to destroy their conceptions, lest the same should injure their persons and their figures. Since the destruction of a human being in its first formation, while he is still in the hands of his artificer nature, receiving life itself, is deserving of public detestation and abhorrence, how much more so must it be to deprive a child of its proper, its accustomed and congenial nutriment when at last it is perfected and produced to the world? It will be said, perhaps, that this omission is of no consequence provided it be nourished and kept alive by human milk, whoever may nurse it. Why does not he who says this, if he be so ignorant of nature's workings, suppose likewise, that it is of no consequence from what body or from what blood a human being is formed and put together? Is

not that which is now in the breasts the blood of the mother which has become white in color by much spirit and warmth—indeed the same that was in the womb? And is not the wisdom of nature apparent also in this—that as soon as this blood, which is the artificer, has formed the new human body within its penetralia, it rises into the upper parts and is ready to cherish the first particles of life and light, supplying known and familiar food to the newborn infants? Wherefore it is believed with reason, that as the power and quantity of the parent cells avail to form likenesses of the body and mind, in the same degree also the nature and properties of the milk are potent toward effecting the same purpose. Nor is this confined to the human race; it is also observed in beasts. For if kids are brought up by the milk of sheep, or lambs with goats, it is plain by experience that in the former is produced a harsher sort of wool, in the latter a softer species of hair. So in trees and in corn, their strength and vigor is great in proportion to the quality of the soil and moisture which nourish them, rather than of the seed which is put in the ground. Thus you often see a strong and flourishing tree when transplanted die away from the inferior quality of the soil. What can be the reason, then, I ask you, that you should corrupt the dignity of a newborn human being formed in body and mind from principles of distinguished excellence, by the foreign and degenerate nourishment of another's milk? Particularly if she whom you hire for the purpose of supplying the milk be a slave, or of servile condition, or, as often happens, of a foreign or barbarous nation, or if she be dishonest, or ugly, or unchaste, or drunken; for often, without hesitation, anyone is hired who happens to have milk when wanted. And shall we then suffer our own child to be polluted with a pernicious contagion, and to inhale into its body and mind a spirit drawn from a body and mind of the worst nature? This, no doubt, is the cause of what we so often wonder at, that the children of chaste women often turn out unlike their parents, being different both in body and mind. Wisely and skillfully has our poet Virgil (4th Aeneid—V 367) spoken in imitation of Homer's lines:

'Sure Peleus ne'er begat a son like thee
Nor Thetis gave thee birth; the azure sea
Produced thee, or the flinty rocks alone,
Were the fierce parents of so fierce a son.'

“ ‘He charges him not only upon the circumstance of his birth, but his subsequent education, which he has called fierce and savage. Virgil to the Homeric description has added these words:

‘And fierce Hyrcanian tigers gave thee suck.’

“ ‘Undoubtedly in forming the manners, the nature of the milk takes in a great measure the disposition of the person who supplies it, and then forms from the seed of the father, and the person and spirit of the mother, the infant offspring. And, besides, who can consider it a matter to be treated with negligence or contempt that while they desert their own offspring, driving it from themselves and committing it for nourishment to the care of others, they cut off, or at least loosen and relax, that mental obligation, that tie of affection, by which nature binds parents to their children? When a child is removed from its mother and given to a stranger the energy of maternal fondness is checked little by little, and all the vehemence of impatient solicitude is put to silence. And it becomes much more easy to forget a child which is put out to nurse than one of which death has deprived us. Moreover, the natural affection of a child, its fondness, its familiarity, is directed to that object only from which it receives its nourishment, and as a consequence (as in the case of infants exposed at birth), the child having no knowledge of its mother, does not regret her loss.

“ ‘Having by this destroyed the foundations of natural affection, however, children thus brought up may seem to love their father or mother, that regard of theirs is not natural but the result of civil obligation and social opinion.

“ ‘These sentiments, which I heard Favorinus deliver in Greek, I have related so far as I could for the sake of their common utility. But the elegancies, the copiousness and the flow of his words could hardly be arrived by any power of Roman eloquence—least of all by any which I possess.”

When this was written, the Emperor Antonius Pius was in power and was destined to be succeeded by Antoninus Marcus Aurelius. There can be little doubt that during these years, which have been characterized as the happiest for children in the history of ancient Rome, the gentle and humanitarian trend of the Stoic philosophy, diffused and inculcated by the Antonine Emperors, had done much to spread the germinal ideas of such pioneers as Soranus and Aulus Gellius. A campaign for infant

hygiene, small in its beginnings, was in the making, though its immediate and even remote effects were soon to be swept away in the bloody days that stretched from the end of the reign of Marcus Aurelius to the accession of Septimus Severus.

1861 *Mintwood Place.*

THE NERVOUS CHILD (Jour. A. M. A., Oct. 11, 1919). According to E. B. McCready, the well-poised, efficient, emotionally stable adult is the exception rather than the rule in modern life, and procrastination as regards proper treatment of nervous and mental disorders is altogether too common. The physicians are apt to belittle the cases when first consulted, and this class of disease is insidious in its onset. Pessimistic prognoses are also dangerous. While some children are born nervous from heredity, some acquire nervousness from habits or disease and others have nervousness thrust on them through faulty home and school training. It is the physician's duty to counteract all these conditions and influences, which tend toward aggravation at puberty. There are physical anomalies—cranial or facial asymmetries, ocular defects, enlarged tonsils, nasal deviation, delayed puberty, abnormal growth, etc. Attempts to classify and label cases are useless—it is enough to say the child is nervous, and, therefore, a potential neuropath or psychopath. Its defects must be looked after as early as possible and its environment modified. Unfortunately, this is adapted to meet the adults' conditions, especially in cities, and no matter how conscientious the parents may be they may lack the training required. Most children are overstimulated in modern life, and many deleterious conditions are overlooked because they are common. Overfatigue in children brings about irritability, and the exciting conditions of urban life are liable to cause it. Diet is also important, as well as fresh air and exercise. Country life is likely to be better in all these respects than city life. The utilization of nature insisted on by Sequin in the educational system is specially important and his general rules for garden schools are quoted, but his ideas, unfortunately, have not been, as a whole, put in practice. McCready promises a description of a practical method of education for nervous children, based on Sequin's theories, in a further article.—*Journal A. M. A.*

DEPARTMENT OF ABSTRACTS

FRANCIONI, C.: ACUTE POLYENCEPHALITIS WITH NARCOLEPSY. (*Bullettino delle Scienze Mediche*, June, 1919.)

A boy, 7 years of age, was suddenly seized with spasmodic movements of both eyes and profound somnolence. Gradually extreme difficulty was experienced in opening the eyes, while micturition became scant. Slight irregular elevation of temperature. On entering the clinic this child presented bilateral ptosis, rigid attitude, indifference to all surroundings and great tendency to fall asleep. This all through a lengthy examination. Tendency to catalepsy of all limbs. Exaggerated reflexes, clonus of feet. Temperature 38 C., pulse 80, not very good. Lumbar puncture, done several times, only revealed lymphocytosis in moderate degree, gradually disappearing as the patient improved. Blood count normal. Wassermann negative in spinal fluid, undecided in the blood.

No previous history of illness. Only 3 months previously the boy had had a slight attack of influenza.

Francioni after discussing his diagnosis emphasizes the fact that for centuries past there has been in Europe a periodic recurrence of what has been variously called encephalitis lethargica or epidemic stupor. He would not venture to connect the present illness with the attack of influenza. C. D. MARTINETTI.

SCHREIBER, G.: EARLY CONGENITAL MYXEDEMA. (*Archives de Médecine des Enfants*, No. 5, 1919.)

This condition is not frequently met and is well illustrated by the case referred to in this paper. The child was seen at 5 months. Was the first of perfectly healthy parents, breast fed and was seen by the author only because it refused suddenly to nurse. Weight had remained stationary for some time (kg. 4.120). All the signs of myxedema were present. No thyroid was discernible on palpation. Length of body 56 cm. Thyroid was administered to the mother, giving 10 centig. of thyroid extract for 10 days, then again after a rest of 5 days. At the age of 11 months the baby weighed kg. 4.480. No teeth had appeared, the characteristic

aspect continued, although some improvement was evident. Thyroid was being administered to the baby itself when it became ill and died of another disease. C. D. MARTINETTI.

MORQUIO, L.: MALIGNANT ENDOCARDITIS IN INFANCY. (*Archives Espanoles de Pediatria*, March, 1918.)

This condition in infancy is rare. Three cases were seen, all following acute articular rheumatism or typhoid fever (1 case). In all was seen embolism with right hemiplegic symptoms. All cases ended fatally. The general course of the disease was that of a general septicemic infection. In only one case was autopsy possible, confirming the diagnosis. C. D. MARTINETTI.

SPOLVERINI, L. M.: ETIOLOGY AND PATHOLOGY OF INFANTILE ASTHMATIC NERVOSIS. (*La Pediatria*, October, 1918.)

Nineteen cases of children who had repeated asthmatic attacks have been studied by Spolverini. Four principal facts have emerged, as follows: All the cases presented a well pronounced lymphatic habitus. In all was evident extreme irritability and excitability of all the peripheral nervous system. There was in almost all a history of uricacidemia in the parents. In all cases considerable improvement was derived from adrenal preparations, iodides, calcium and mineral waters.

The adrenal preparation employed was one named adrenofer and was given upon the theory that in asthma of nervous origin the primary cause might be a lesion of the bronchial sympathetic system. This was proved true by experiments with an agent that caused depression of tone of the sympathetic, such as lymphogangline, whereby the symptoms were immediately aggravated. The precise nature of infantile nervous asthma would thus be found to be in a loss of balance in the endocrine function of the lymphatic ganglia. More light on the subject will be given later by the accurate determination of hyperfunction of the lymphatics and of the hypofunction of the adrenals. C. D. MARTINETTI.

EARL, ROBERT: SURGICAL TREATMENT OF JACKSONIAN EPILEPSY. (*Minnesota Medicine*, September, 1919, p. 325.)

The author believes that the outlook in Jacksonian epilepsy without the help of surgery is practically hopeless. Under this

head he places the clonic spasms which are known to have the exclusive origin in the motor area of the cortex, and which follow the anatomic arrangement of the cortical centers, affecting first one, then the other, and so on in rotation. Consciousness may be retained or lost; the latter is usually the case where the entire body participates in the seizure. The course of the disease is progressive so that in time it may become similar to the grand mal of essential epilepsy, but from the surgical standpoint they must be kept separate for surgery will have much to do with the Jacksonian type and little to do with the essential form. The etiology is most frequently trauma, including birth injuries, with resulting meningeal hemorrhages, cortical lacerations which may result in cyst formation, brain softening, meningeal adhesions and scars. As operations with the removal of cortical irritation have not been particularly brilliant, it is all the more necessary to take preventive measures. Immediate surgical treatment in all cases of head injuries, in which there is evidence of fracture, depression, hemorrhage, or severe edema, will do much to avoid a possible future epilepsy. In operating, cerebral localizations should be our guide to remove focal lesions causing Jacksonian epilepsy. When there is difficulty in determining the exact location of these lesions, the faradic current is of great assistance, the electrode being applied directly to the cortex and watch made for muscular contractions of the face, trunk and extremities. The prognosis for focal epilepsy although better than that for the idiopathic group, is still far from what we could wish. In the cases, however, in which a definite lesion is found and removed, a complete cure may be looked for.

JAMES HOYT KERLEY.

PASTORE, R.: CLINICAL RESULTS OF VACCINE THERAPY IN PNEUMOCOCCUS INFECTIONS. (*La Pediatria*, September, 1918.)

In the Pediatric Clinic of Palermo, the author has been giving a thorough trial to vaccine therapy in infective diseases of childhood. While administered hypodermically the vaccines have seldom given favorable results, the same vaccines administered intravenously have proved remarkably efficacious. Eight cases of pulmonary infection from pneumococcus are reported, several

of them with empyema. The vaccine in all apparently arrested the process without surgical intervention.

C. D. MARTINETTI.

GERSTENBERGER, H. J. AND CHAMPION, W. M.: THE CONSTIPATING QUALITIES OF ORANGE JUICE. (*American Journal of Diseases of Children*, August, 1919, p. 88.)

Observations made by Gerstenberger and Champion in a normal infant 10 months of age to ascertain the relative position as a cathartic or laxative of orange juice to an equal amount of a 10 per cent sugar solution composed of 6.5 per cent glucose and 3.5 per cent sucrose show in one period no difference between the two solutions, and in the other period a relative laxative advantage of the sugar solution over the orange juice, or better, a relative constipating ability of orange juice as compared with the effect obtained with the 10 per cent sugar solution. During the sugar solution period anywhere from 95.71 to 96.53 per cent of the water output went by way of the kidneys, and from 4.29 to 3.47 per cent went through the intestines, while in the case of the orange juice from 97.15 to 97.25 per cent of the fluid output went by way of the kidneys, and from 2.85 to 2.74 per cent by way of the intestines. In other words, orange juice, relatively speaking, has been less laxative than a 10 per cent sugar solution when given in doses of 15 c.c., six times in 24 hours. This observation confirmed their practical experience that orange juice in the maximum amounts ordinarily used had more of a constipating than a laxative effect, and, therefore, should only be used as an antiscorbutic or as a diuretic, but not as a laxative, and especially not for children who are already constipated. These observations they claim point to the important rôle that diuresis may play in the production of constipation, and it may be possible that some of the cases of constipation in infants supposed to be due to an abnormally long retention of the feces in the gut and a consequent too complete absorption of water in the large intestine are primarily due to the presence of a factor that causes an abnormal increase in the excretion of water through the kidneys.

C. A. LANG.

AN ELECTRO-MYO-GRAPHIC STUDY OF CHOREA. (Johns Hopkins Hospital Bulletin, February, 1919, p. 35.)

In a clinical study of the neuro-muscular phenomena of chorea by a graphic method, quite a new attitude is taken from the usual endo-carditic or infectious standpoint. The following conclusions were reached after making studies of voluntary contractions of normal muscles, voluntary contractions of involved muscles, and of involuntary contractions of involved muscles:

1. Choreiform movements give an electro-myo-gram similar to that of a short, normal voluntary muscular contraction.

2. The inability to maintain voluntary contraction is clearly shown in the electro-myo-grams.

3. Weakness of muscular contraction is shown electro-myo-graphically by the lessened electrical discharge.

HUGH CHAPLIN.

HOLT, L. EMMETT; COURTNEY, ANGELIA M.; and FOLES, HELEN L.: FAT METABOLISM OF INFANTS AND YOUNG CHILDREN. II. (American Journal of Diseases of Children, June, 1919.)

The authors continue their observations on fat metabolism. The material in this article consisted of 128 stools of 77 infants, whose ages ranged from 2 to 18 months, fed on modified cow's milk formulas. The average fat percentage of the dried weight in normal stools was 36.2. The hard, constipated stools showed no variation from this figure. In the stools not quite normal in appearance, the average fat per cent was slightly lower. In severe diarrhea the fat per cent of dried weight was much higher, reaching an average of 40.7 per cent. The soap per cent of total fat was very high in both normal and constipated stools, averaging, respectively, 72.8 and 73.8 per cent. As the stool became less normal in appearance, the soap fat diminished rapidly and averaged in the loose stools only 30.6 per cent of the total fat, in the diarrheal stools 12.4 per cent, and in those of severe diarrhea only 8.8 per cent of the total fat, the neutral fat was less than 10 per cent of the total fat in normal and constipated stools. It increased as the soap fat diminished and in diarrheal conditions made up about 60 per cent of the total fat in the stools. The free fatty acids constituted about 17 per cent of the

total fat of normal and of constipated stools. It was increased somewhat as the stools became less like the normal and in the diarrheal stools was over 30 per cent of the total fat of the stool. No definite relationship was shown between the daily fat intake and the per cent of fat or the distribution of fat in the stool. The average per cent of the fat retained with normal stools was 91.3 per cent of the intake. The retention was but little lower when the stools were somewhat harder or softer than normal, or were not homogeneous, or contained more or less mucus without being distinctly watery. As the water in the stools increased, the per cent of retention dropped markedly, reaching in severe diarrhea 58.4 per cent of the intake. There was no striking relation between the fat intake and the per cent of the intake retained, except when the intake was abnormally low. C. A. LANG.

AUSTIN, R. S.: *BACILLUS TUBERCULOSIS IN THE TONSILS OF CHILDREN CLINICALLY NON-TUBERCULOUS*. (*American Journal of the Diseases of Children*, July, 1919, p. 14.)

In a review of the literature, Austin found that Latham reported 45 cases, 7 of which showed tuberculosis. Friedman reported 145 cases with 17 showing tuberculosis. Kingsford reported 17 cases with 7 cases of tuberculosis. Hess reported 13 cases with 1 case of tuberculosis. Mitchell reported 100 cases in which the tonsils were removed from patients with tuberculous neck glands; 44 of these had tuberculosis of the tonsils. He reported also 100 cases in which the tonsils were removed from patients without signs of tuberculosis; 13 of these had tuberculosis of the tonsils. Before commencing the examination of the tonsils from the group of cases on which his paper is based Austin developed a method by which inoculation of guinea-pigs with tonsillar material would not produce a high mortality, but which at the same time would not involve destruction of the tubercle bacillus. Five pairs of tonsils were removed from healthy children and after removal were received into a sterile tube, washed thoroughly, then placed in a sterile glass mortar, minced into fine pieces with pointed scissors and ground with a glass pestle, all with aseptic precautions. A small amount of physiologic salt solution was found to facilitate the grinding. The ground material, after being thoroughly mixed, was then

divided into two portions. To one of these portions was added a very small amount of growth from a culture of tubercle bacillus which was mixed in thoroughly. Each of the two portions of tonsillar material was then mixed well with about twice its volume of antiformin and the mixture placed in a centrifuge tube in the incubator at 37° for 3 hours or less. The antiformin was then removed as much as possible by successive washings in the centrifuge with saline solution. After the last washing, about 3 c.c. were left in each tube, half of this being used to inject into the crushed lymph glands in the left groin of a guinea-pig of about 300 grams weight, the other half being preserved in case the animal died prematurely. Of the guinea-pigs injected with the material to which no tubercle bacillus culture had been added all but one survived for 7 weeks; they were then killed and were found to show no evidence of tuberculosis at necropsy. All but one of the animals receiving material to which tubercle bacilli had been added developed firm enlarged glands in the groin on the left side in from 2 to 5 weeks. They were then killed and revealed tuberculous lesions in these glands, in the spleen and sometimes in the liver and elsewhere. The excised tonsils from 45 children were examined for the presence of tuberculosis, using the inoculation test as above described. Of the 45 children, 15 were from 2½ to 5 years of age, and 30 from 5 to 12 years of age. All were well or fairly well developed and nourished. There was a history of tuberculosis in the families of two of the children but none of the latter had any record of tuberculosis in their past histories. The cervical lymph glands were enlarged in 21 cases, in none to any very marked degree or with suggestion of tuberculosis; in the other 24 cases these glands were not enlarged. In no case was there evidence on physical examination of tuberculosis in the lungs or elsewhere. Only one case gave a positive test for tuberculosis which proved to be of the human type. The author states that although tuberculosis of the tonsils in children is not rare yet most of the cases occur when there are tuberculous lesions to be found elsewhere in the body, especially in the cervical lymph glands. The occurrence of the tubercle bacillus in the tonsils of children without clinical evidence of tuberculosis, however, is not frequent.

C. A. LANG.

BOOK REVIEW

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS. By GEORGE WILLIAM NORRIS, A.B., M.D., Assistant Professor of Medicine in the University of Pennsylvania; Visiting Physician to the Pennsylvania Hospital; Assistant Visiting Physician to the University Hospital; lately Colonel, M.C., U. S. Army. AND HENRY R. M. LANDIS, A.B., M.D., Assistant Professor of Medicine in the University of Pennsylvania; Director of the Clinical and Sociological Departments of the Henry Phipps Institute of the University of Pennsylvania; Visiting Physician to the White Haven Sanatorium. With a chapter on the Electrocardiograph in Heart Disease by Edward B. Krumbhaar, Ph.D., M.D., Assistant Professor of Research Medicine in the University of Pennsylvania. Second Edition Revised. Philadelphia and London. W. B. Saunders Co., 1920.

The reviewer of this book first came across it 2 years ago while in the Army. Books were scarce, and a medical library was not at hand. Being a children's man, and not having listened to adult hearts and lungs for some years, he was frequently puzzled in regard to the interpretation of the signs he found, as naturally they were quite different to those found in infants and children. He accordingly used Norris and Landis as the basis for brushing up half forgotten lore on the physical examination of the chest, and incidentally discovered what an unusual book it was in every way. This second edition more than fulfils the promise of the first. It still remains the best book of its kind written. Much has been added. Among the new topics may be mentioned spirochetal bronchitis, influenza, streptococcus empyema, chronic inflammatory conditions of the lungs of uncertain etiology, calcification of the lungs, pneumopericardium, etc. In addition, the rest of the book has been somewhat re-written in the light of present day additions to our knowledge. Of especial interest to pediatricists is the section on physical findings in infants and young children written by Dr. Gittings. Another interesting section is the chapter on the electrocardiograph in heart disease by Dr. Krumbhaar. The book is profusely illustrated throughout, and contains many cuts of anatomic sections which prove a real help in elucidating the text. It is a book that should be in every doctor's book case, be he pediatricist or general practitioner.

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS

HELIO THERAPY: ITS GENERAL USE IN PEDIATRICS.

By WILLIAM PALMER LUCAS, M.D.,

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HISTORICAL: The mythology of Egypt, Syria, Persia, and Greece constantly refer to the sun and its intimate relation to man and his destinies. The sun was life giving and not to be feared, but to be revered and worshipped. Aesculapius, the famous Greek physician, was supposed to be the son of Apollo. In Roman days, its use was certainly appreciated, especially from a pleasurable aspect. We find that the Roman aristocracy built solaria in their homes and enjoyed the sun bath, Herodotus going so far as to outline the method of taking one. The Romans made use of it also for nervous diseases, arthritis and certain gynecological

conditions as well as in diseases of the skin and of the extremities, such as edema and elephantiasis. Among elementary races, we find the power of the sun considered from a religious rather than a medicinal standpoint. In Central America, even before the Spanish days, we find that it was used in various conditions and is now used in syphilis, tuberculosis, and rheumatism. In North America, the Indians worshipped the sun and believed in its healing power. Due to this fact, that the sun had been worshipped, scientific medicine has more or less discarded what seems to be a valuable adjuvant to ordinary hygienic treatment. In modern times we find prominent physicians, Swedish, Russian, French, English, German and Austrian, more and more applying direct rays of the sun as an aid in the treatment of various chronic conditions. Certainly, since the beginning of this century, its use has become more and more general among members of the medical profession and this is based on definite physiological reactions which are produced by the sun's rays.

PHYSICS OF THE SUN'S RAYS: The sun's rays, on account of the extreme heat of the sun, proceed at a tremendous rate through the surrounding ether. Waves are thus created, which are supposed to be spherical and to move in all directions from the center. The rays proceed at the same rate but as various rays are of various lengths, the speed at which they proceed varies very considerably. The distance of the earth from the sun, calculated to be 90,800,000 miles, is traversed by these rays in approximately 8 minutes. Scientific investigations have demonstrated that the vibrations from the sun possess various qualities, the ones which we usually appreciate being heat and light. These qualities depend on the various wave lengths and the number of oscillations per second, the rate of all waves being the same, that is 186,500 miles per second.

We are all familiar with the spectrum, produced by the sun's rays passing through a prism, giving red at one end and violet at the other. The 7 colors of the spectrum are simply the wave lengths which the human retina can distinguish. There are, however, many other rays on either side of the red and violet which modern scientific investigations have clearly demonstrated. The presence of infra-red rays can be demonstrated by placing a thermometer beyond the red rays which we appreciate as being the main heat rays of the spectrum. Beyond the violet rays, by

equally delicate instruments, we can distinguish other photographic rays or ultra-violet rays. Beyond the infra-red rays are the so-called Hertz waves and the N-waves, both of which are supposed to be heat waves of various intensity, whereas beyond the ultra-violet rays, at the other end of the spectrum, are the x-rays or roentgen rays. From the N-waves, which are the longest waves and the waves with the least frequency per second which have so far been demonstrated, and the x-rays which are the shortest rays and the ones with the greatest frequency per second, we have many variations in wave lengths. All these waves, however, are supposed to have 3 definite properties, heat, light and chemical action, though these differ quantitatively in the various wave lengths.

Beyond the Hertz waves are the electric waves which are supposed to originate from sun spots and to produce meteorological and magnetic conditions on our planet. Among these sun rays or waves, we find the waves which have been used for wireless telegraphy and which were first described by Professor Hertz in 1886. They are termed electrical because they can be produced by such apparatus as the Leyden jar and the Ruhmkorff coil. These rays are not electrical waves but are ether waves, though they can be transformed into electrical waves as we know them. Their effect on the body is probably much the same as high frequency currents of electricity which are used therapeutically and are undoubtedly concerned with nerve action. Especially is this probably true of N-waves which were first described by Blondlot of Nancy (Nancy-N). Their exact position in the spectrum has not been finally settled, some holding that the N-rays are really at the other end, near the x-rays. The N-rays have been shown by Charpentier to increase the luminescence of the glowworm and this he believes to be a proof that the sun's rays intensively influence the body cells.

These rays are also produced in a number of ways, as when we compress matter by muscular contraction. They emerge from irritated nerves and they radiate from brain centers when they are momentarily in action. The action of the heat and light rays, in the neighborhood of the red and yellow rays, is far better understood than is that of the so-called chemical rays, in the neighborhood of the violet and ultra-violet, which possess powerful chemical action. This chemical action is produced by the fact

that they link together atoms of oxygen to form ozone, and ozone has a very marked bactericidal property, clearing the atmosphere as well as polluted water. For this reason, these waves are present in greater numbers at higher altitudes for from 25-30 per cent of these chemical rays are taken up by dust in a lower altitude, especially in cities. The roentgen or x-rays probably never reach the earth but nevertheless exist in the sun's rays.

The bactericidal action of the sun's rays has been known for many years. Down and Blount in 1877 and T. P. Hunt in 1878, showed the bactericidal action of the sunlight. Dieudonné found that direct sunlight killed or inhibited bacteria. The bactericidal power of the ultra-violet rays varies somewhat according to altitude. The higher the altitude the quicker and more certain is the bactericidal effect, being nearly twice as rapid at 5,000 feet altitude as at the seashore. Diffuse light also requires much longer for its bactericidal action.

This chemical action is not only proved to exist by its action on bacteria but also by its action on toxins and antitoxins, having a very much greater effect on toxins than on antitoxins. The diphtheria toxin quickly loses its toxic property by the action of these chemical or actinic or ultra-violet rays, whereas diphtheria antitoxin is much less affected and takes a longer time to lose its antitoxic property. Further demonstration of its chemical action can be easily shown in its power in the photographic plate. Chalons (Bleyer) said "No substance can be exposed to the sun's rays without undergoing a chemical change. Chlorine and hydrogen will not unite in the dark nor will chlorine and carbonic acid gas, but if the same gaseous mixtures are exposed to the sunshine, they combine with the force of an explosion. In 1832, Sir John F. W. Herschel demonstrated the chemical activity of the sun's rays by the following experiment. If a solution of peroxalate of iron be kept in a dark place, or if it be exposed to 212° F. for several hours, it does not undergo any sensible change in its physical properties, nor does it exhibit any phenomena which may be considered as the result of any elementary action. If, however, it be exposed to the influence of solar light in a glass vessel provided with a tube, the concentrated solution of oxalate of iron soon presents a very interesting phenomenon. In a short time the solution receiving the solar rays develops an infinite number of bubbles of gas which rise in the liquor with increasing rapidity

and give the solution the appearance of a syrup undergoing strong fermentation. This ebullition always becomes stronger and almost tumultuous when an unpolished glass tube is immersed in it with a small piece of wood. The liquid itself is afterwards thrown into ascending and descending currents, becoming gradually yellowish, turbid and eventually precipitates peroxalate of iron, in the form of small brilliant crystals of a lemon yellow color, gas continuing to evolve. When a solution of platinum in nitromuriatic acid, in which the excess of acid has been neutralized by the addition of lime, and which has been well cleared by filtration, is mixed with lime water, in the dark, no precipitation, to any considerable extent takes place for a long while; none whatever, indeed, though after very long standing a slight, flocky sediment is formed, after which the action is arrested entirely. But if the mixture, either freshly made or when cleared by subsidence of this sediment, is exposed to sunshine, it instantly becomes milky and copious formation of a white precipitate (or a yellow one, if the platinic solution be in excess) takes place, which subsides quickly and is easily collected. The same takes place more slowly in cloudy daylight."

The sun's physiological action has been studied less than its physical action. It is rather more difficult to accurately measure the effects of light and sun from a physiological point of view than it is from the point of view of physics. Still certain rather significant observations have been made during the past few years. Rollier mentions the increase in hemoglobin and red blood cells, also the increase in eosinophiles. D'Oelsnitz has carried on some very interesting observations at Nice, in which he attempts to demonstrate changes, immediate and late, in the temperature, respiration and blood. Temperature and respirations are usually increased at the first of the treatment. Very soon the respiration strikes an equilibrium unless there is intolerance to the treatment when it continues to be irregular. Temperature is always elevated, as is the pulse, but this acceleration strikes a constant equilibrium which has more or less of an individual variation and an hour after treatment it is back to its normal. Irregularity in temperature and pulse, which continues after the treatment, is a direct indication of intolerance and if more than a degree of fluctuation in temperature occurs, especially, if this is irregular, it should be taken as an indication that the treatment is not

being well tolerated. As to the change in the blood, the number of red blood cells is increased and the hemoglobin is also increased. The variation in both red cells and hemoglobin may not be noticed immediately. However the leukocytes respond more quickly. This response, of course, varies considerably according to whether the tuberculous process is open or closed.

The mononuclear changes are perhaps more significant. Arnith's formula is of some value from a prognostic standpoint, being pushed to the right in favorable cases. There is a definite increase in the eosinophiles. This is equally true of marine baths, as well as sun baths, which would be a point in favor of having treatment carried on at the sea level instead of at a high altitude. The tuberculin reaction is increased in active cases and this is an indication of proper progress of the disease. D'Oelsnitz considers that keeping close observation over the variations in temperature, circulation, respiration and blood gives us a definite criterion by which to judge the success or failure of the treatment. In pulmonary tuberculosis, as well as in intestinal tuberculosis, hemorrhage is always a contra-indication to continuance of the treatment. Progressive loss of weight is also a further contra-indication, though at first loss of weight may occur in cases that progress otherwise favorably; however, loss of weight should not be allowed to continue very long, and indicates a diminution in the amount of treatment. Pigmentation is always a sign of tolerance. D'Oelsnitz made an extended report before the French Pediatric Society, November, 1913, in which he considered the normal and abnormal reaction to heliotherapy, also the indication for its use in tuberculous infants. This is practically the only attempt to make a clinical and physiological study of its action in children. There seem to be no studies carried on with any show of accuracy or with any attempt to draw up any formulae for carrying on this type of treatment. Many authors mention that anemia is benefited by an increase in the hemoglobin and red cells. They do not state what their conclusions are based on. The discussion of whether the treatment is better carried out at sea-level or altitude varies almost entirely as to whether the writer is located on the sea or at an altitude. The unanimity of opinion seems to be that moderate altitude is best except in children where marine treatment is of considerable value especially in open tuberculosis of the bones. The general feeling is that pulmonary tuberculosis is

not much benefitted by treatment with the direct rays of the sun. Conditions in which it has been used are tuberculosis of the bony system, open tuberculosis with fistulas and secondary infections. Practically all the literature, especially from the time that Bernhardt and Rollier started to develop their sanatoria, have been along the lines of chronic tuberculosis of the bones. There seems to be little doubt but that this form of tuberculosis receives a distinct benefit from it.

Tuberculous peritonitis has also been treated extensively by French, German and English writers and their reports are on the whole very favorable. Rollier mentions its value in peritonitis, and, in combination with surgery, especially in peritonitis cases with extreme ascites. D'Oelsnitz also considers that tuberculous peritonitis can be very successfully treated even if there is considerable temperature. Simon thinks there is no question that in chronic cases, where the peritonitis has passed the active inflammatory stage, it is markedly beneficial. Catalena mentions its use. Osborne, in New Zealand, reports an interesting case of tuberculous peritonitis healed by its powers.

In cervical adenitis, there is little doubt that it is of considerable value, not only in the stage before abscess has set in but even in cases that have been treated for a long time and apparently have gotten a secondary infection. In these cases it is especially indicated. Rollier believes that it is of definite benefit in glandular cases, both cervical and tracheobronchial. Joubert and Rivier also believe that glandular tuberculosis is favorably affected, both cervical and tracheobronchial. The sea shore is probably better for glandular tuberculosis and tuberculosis with secondary infection than the high altitudes. Rollier, Leriche, Joubert, Rivier and others believe that it is applicable to the treatment of renal tuberculosis and cystitis, especially noting that the pain and discomfort in cystitis and pyuria are markedly diminished, even where cure is not affected. Authorities differ considerably as to the efficacy of this treatment in pulmonary tuberculosis. Apparently it depends on what stage the pulmonary tuberculosis has reached and the individual reaction of the patient. These are the 2 important considerations. There is little doubt that in active progressive cases of pulmonary tuberculosis, where there have been frequent hemorrhages, where the parenchyma is rapidly being involved, and where there is a septic type of temperature, sun baths are contra-

indicated, whereas the chronic or fibrous types of pulmonary tuberculosis, which are not progressing in a septic manner, may be greatly benefitted by the tonic action of the direct sun rays. There should be very close medical supervision in such cases. Simon considers that in the torpid bronchial form, even where there are cavities that are stationary, the results may be beneficial, but in the febrile type it increases the fever and there is also the chance of hemorrhage and in these cases the nervous symptoms are also increased and the weight and appetite are adversely affected. On the other hand, Pottenger believes that it is an individual matter that some cases of pulmonary tuberculosis are benefitted and that the difference between stimulation and irritation in these cases is only one of degree. He thinks that if cases are watched carefully it can be noted which cases are losing weight and appetite and where nervous irritation is being increased. In such cases it is contra-indicative, whereas in anemic cases the hemoglobin and number of corpuscles are increased in the circulation, tissue tone is improved and condition of skin benefitted. Pottenger believes very strongly that sunlight has no specific action and cannot be considered as a cure, but as an aid to be classed with open air, good food, hygiene, proper adjustment of rest and hydrotherapy. A. Treves and J. Andrien both say that heliotherapy is not a form of treatment. Malgat does not think it applicable to pulmonary tuberculosis and tuberculosis of the pleura, as he says it provokes congestive processes and may bring on hemoptysis. Even in latent cases, he thinks it brings out the processes and makes them active. He also cautions its application in the tracheobronchial adenopathies.

Its use in this country in tuberculous conditions has been carried on very extensively by Campbell. He reports many cases of tuberculosis of bones in which there has been very marked improvement. These have also been reported by Hammond of Providence and Yelt. Pottenger has used it as an accessory in the treatment of pulmonary conditions and also Kime.

A number of men have reviewed the work as seen at Rollier's Clinic, especially Dietrich, Yelt and Austin. The use of heliotherapy in non-tuberculous conditions has received considerable attention. Aimes, in a very good article on the use of heliotherapy in non-tuberculous affections, speaks of its affect. He believes that it should be used more with convalescents as it shortens their

period, especially where there is a tendency to anemia, but in connection with cachectic and wasting conditions, it may be a contra-indication as they cannot stand the stimulation. However, under the treatment from a convalescent standpoint, hemoglobin is increased and weight is put on very rapidly. He found it of considerable benefit in scoliosis, rachitis, acute articular rheumatism and in tracheobronchial adenopathies. He quotes from Emmett of Philadelphia and Snegurieff of Moscow, who also claimed that it was very valuable. Kellogg, at Battle Creek, makes the same claim. The debilitated functions are exhilarated, nutrition is very markedly improved, activity of secretions is marked and the internal organs are better oxygenated. Kellogg, with Singer of Berlin, says that neurasthenic patients are benefitted by sun baths, especially in combination with other mechanical and therapeutic measures.

LOCAL ACTION OF THE SUN: Aimes finds it of great benefit as in healing wounds and varicose ulcers, also in erysipelas. Its local effect is mentioned by many writers, Apery, Bernhard, Widener, and Joubert. Borel, in a report before the Congress at Rome, 1912, said it could be used in actinomycosis, cutaneous syphilis and mycoses. These effects are all probably due to hyperemia. Percy speaks of its affect on fractures; he thinks that the callous formation is increased. Hammond thinks it of value in fractures and osteomyelitis.

Borel, Lundsgaard and Grunholm have used it with success in the treatment of the conjunctiva and trachoma, though they mention the treatment as dangerous and should be carried out with care.

According to Malgat, heliotherapy is not found to be successful in tuberculous conjunctivitis or in tuberculous infections of the larynx. However, in this connection, Johnston tells how he treated his own larynx by direct sunlight with remarkably rapid results apparently getting more relief in 6 weeks by applying direct rays by means of laryngeal mirrors to the larynx than by any other means of treatment, and concludes that the direct rays on mucous membranes are apparently successful. Singer comments on its use in nervous conditions. Aimes mentions its use in gynecological conditions. Badin and Gilbert de Balaruc have obtained results in perimetritis; Snegurieff of Moscow in met-

rorrhagia. Markoe reports cases of septic gynecology in the New York Lying-in-Hospital, which have apparently done far better than by any other form of treatment. Young and Williams, in the City Hospital in Boston, mention its effect on septic gynecological cases also. Both Markoe's and Young's and Williams' mortality statistics are worthy of consideration by gynecologists. Campbell also mentions it in non-tuberculous cases, especially osteomyelitis. Willy Meyer of New York, Pryor of Buffalo and Crile of Cleveland, speak enthusiastically of its use during the present war.

There has been considerable discussion as to whether light really penetrates the body. Finsen, in his original experiment, apparently proved to his satisfaction that light rays undoubtedly penetrated far more than we had ever considered they did before his time. He placed a photographic plate under the lobe of the ear and exposed it to the direct sun rays and found that when he used no pressure on the plate, against the lobe, the plate was not affected in 5 minutes, whereas if he pressed the lobe of the ear, pressing out all the blood, the plate darkened in 20 seconds. He concluded that the red blood corpuscles absorbed the light rays. Malgat, Rivier and Aimes claim that the red blood corpuscles become saturated with the sun's rays and they convey this energy to all parts of the body. As proof of this, they placed a photographic plate against the shaded part of the body and found that it was acted upon. They claim that it is in this way that anemic and rachitic children, removed from dark tenements to the country, show the marvellous therapeutic effect of pure air and sun rays. They feel very strongly that the red blood corpuscles make use of the chemical rays and that metabolic processes are augmented. Finsen's experiment of painting his forearm with India ink and preventing the intense erythema which developed on portions of his skin not so painted, seemed to prove that pigmentation converts chemical rays into heat rays. This is probably the reason why the dark skinned people, as the negroes, are protected from the chemical rays more than the blondes and it can be demonstrated clinically that white, unpigmented skins do develop pigmentation which apparently protects them from a harmful action of the sun's chemical rays. Zimmern considers the pigmentation as a multitude of thermic foci, transmitting the energy to the blood plasma beneath. That pigmentation is of con-

siderable value is found throughout literature. Rollier believes that it is one of the main indications in the prognosis of the treatment. An individual, who does not pigment, will not do as well as one who does, though this is not an invariable rule, as under care, even those who do not pigment will derive considerable benefit from short exposures and apparently their skin becomes accustomed to the sun's rays so that in time they can stand long exposures. Rollier feels that pigmentation further protects against other infections. He cites an interesting experience in his sanatorium during an epidemic of varicella. The children who were thoroughly pigmented and bronzed had no lesions, except in areas where they were not pigmented, as under casts. Unpigmented sections were uniformly affected. He also feels that pigmentation prevents the appearance of furunculosis and acne.

DANGERS: Besides the dangers of heliotherapy mentioned in connection with pulmonary tuberculosis, there are certain others that are to be considered. Romer mentions 2 cases of sun stroke, which, however, did not occur among patients taking sun baths, but uses them as illustrations of dangers that may occur. Singer, Pottenger and others mention the nervous irritation that occurs in some patients from over-exposure and over-stimulation. Unless care is taken during the early part of the treatment, sun burns and erythemas may be developed which are not only annoying, but prevent a successful carrying out of the treatment. Care, therefore, should be taken in the dosage, especially until the skin becomes accustomed to the sun's rays. Where there is a moderate increase in temperature and loss of appetite, the length of exposure should be diminished or it may have to be discontinued for a short time. Melaschen also mentions the dangers of over-exposure; the fact that fever, palpitation, insomnia and painful erythema may be produced unless care is taken in the dosage of the sun's rays.

In February, 1918, during the war, I visited Rollier's Sanatorium at Leysen and to my surprise found his institution crowded with children and some French and English soldiers. Altogether some 2000 cases. The hillsides were dotted with the various hotels for the treatment of different types of cases. The children came from all over the world, Russia, Germany, America, France, Italy, Switzerland, etc., and the majority were suffering

from bone tuberculosis. These cases were being treated by the direct rays of the sun and practically without surgery and without casts. Upon arrival the patients are gradually accustomed to the direct rays of the sun. Rollier's method is to begin by exposing the feet of the patient first, and by slow ascending exposure of legs, thighs, abdomen, chest, back, etc., to reach the sun bath for the entire body for over an hour at a time, by the end of the first month. The body becomes pigmented in varying degrees, shading from a light brown to a rich mahogany color. As the patients become accustomed to the sun, they spend the entire day out of doors with loin cloths and sun hats and sandals as their only covering. The children have their lessons, their rest periods, their games, all out of doors, and when our party was there, it was a cold winter day with winter snow crust covering the hills and we were cold in spite of our fur coats and heavy clothing. But the children, playing and working in the sun with just loin cloths and sandals, were glowing with warmth. Those lying out on their beds were even moist with perspiration. The war time picture was there, in the many French and English soldiers suffering from bone tuberculosis.

The great impression made upon me was the fine healthy condition of the children. Their faces were bright, animated, filled with life and spirit and not the usual passivity of the institution case. Their color and the tone of their muscles, I shall never forget. They were so normal and healthy and their muscles were hard and beautifully rounded out. The affected areas were usually in a healthy condition, even where there were discharging sinuses. This impression of the splendid general tone of the children only confirmed my own previous personal experience with the sun treatment in California. The length of stay at Rollier's Sanatoria averages a year and a half. Rollier told me that very few had major operations during their stay at Leysen and there were few relapses after leaving the sanatoria as cured. A point Rollier makes, and one which my own experience confirms, is that every child must be treated as an individual; that there are few routine rules. Every child has a careful regimen worked out as to diet, sleep, recreation and study, as well as the amount of direct sun exposure. Rollier's success is undoubtedly due to this careful individualistic attention.

In France during the war, Dr. Paul Armand-Delille, Medicin-

Chef of Rapatriés, carried on a sun school, in connection with the American Red Cross work, at Mounetier, in the mountains near Evian. These children came from repatriated families, some members of which had developed tuberculosis. The children were first accustomed to the sun's rays and to the elevation. After that, they were allowed to go to outdoor school in loin cloths, sandals and hats. I visited the sunny hillside one cold spring afternoon and the children with their teacher, sitting at their portable desks, which had been carried into the open field opposite the buildings, were hard at work for a time. Then would come a period of play and gymnastic exercises. They were in the sunshine from 8.00 A.M. in the morning to 4.00 or 5.00 P.M. These children showed the same pigmented skin, the same firm hard tissues. Their general appearance was that of exuberant life and health. This school was not for a cure of any disease but was to prevent disease by building up resistance. It was the modern preventorium which is being agitated so extensively and developed in many places throughout this country for children from tuberculous families.

In connection with Madame Gillet Motte of Lyons and Dr. Armand-Delille, we organized a preventorium where the sun treatment was carried out at Sylvabelle on the Mediterranean. The children there were largely from the occupied area of the north of France, who were repatriated through Evian before the armistice and directly from the north after the armistice. The cases were mostly those of malnutrition, due to the poor food and hygiene these children had been forced to endure for 3 or 4 years. These children from the north showed great retardation in growth and development, children of 10 and 12, looking like children of 7 and 9. After from 3 to 6 months at Sylvabelle, they would entirely recapture their normal development and growth. In countless cases, the changes wrought were almost unbelievable; under their pigmented skin the connective tissue had not only recovered its elasticity and tone, but the limbs had acquired a most astonishing muscular development. Their entire bodies had beautiful symmetrical modellings, in sharp contrast to the wasted flabbiness shown when their sun treatment began.

All these foreign experiences and study of these different experiments have confirmed me in my valuation of the sun treatment for the children of our own country. Since coming out to California, 6 years ago, I have consistently used heliotherapy as

a part of definite treatment for a large number of children with various conditions. Feeling that the sun treatment is simply a part of a definite regimen in the treatment of various conditions, and that its main effect is that of a general tonic, I have used it for that effect wherever needed. In the type of cases I shall describe, I have found it of great assistance. The sun treatment alone cannot create the effect desired. The use of the sun becomes one of the factors in a course of treatment that includes diet, exercise, play, rest, and sleep, and all these factors must be worked out separately for the individual child. I have found the greatest success in cases where every detail of the regimen has been carried out faithfully. Most of the cases represent chronic conditions where malnutrition and delayed development have been produced from various factors. In such cases a carefully worked out dietary, recognizing their digestive capacity, is most important. The regulation of the bowels is to be constantly guided by the amount and kind of food, fruit and water taken into the system and special exercises rather than by medicine. One might say that the factor of rest cannot be over emphasized, as, upon analysis, the majority of these cases expend more energy, than their food intake warrants, for normal growth and development. These cases are found to be growing and developing at a sacrifice of their vital energies, especially their nervous systems. This makes the amount and kind of exercise, the amount and condition of sleep most important factors in the regimen if we expect them to regain their normal weight, growth rate and nervous poise. The consideration of the nervous and psychological systems is just as important as the emphasis placed upon a well balanced diet. In this connection, the type of play and exercise must be considered as a definite part of the treatment. The school work can be adapted to each child, so that during the treatment, more rapid progress in their school work is often made than at any previous period.

The application of the sun treatment rests, first, upon the well established point emphasized by Rollier, "that heliotherapy has just so much the greater efficacy, the greater surface of integument exposed and the more prolonged the duration of the exposure." For this reason, much better results are obtained from general rather than the local exposure of one part of the body. The second point emphasized is the progressive exposure in order to accustom the child to the sun rays and to avoid the

danger of burning, which, in certain children, such as blonde and red haired children, is easily produced by too long exposure to the sun at the beginning. In giving any programme for the sun treatment, the constant individual variations must always be remembered and allowances made for them. The effects of the sun's rays cover a wide range of individual idiosyncrasies. Some children respond quickly, others slowly. Some have rise of temperature, others may have increased pulse rate, others may become excessively irritable under the treatment. It is a common



FIG. 1.—Girls taking sun treatment at Sunshine Preventorium. This sanatorium was opened in July, 1919, under the auspices of the California Tuberculosis Association. There are accommodations for 12 girls from 6 to 12 years of age. Only cases from tuberculous homes without open lesions are taken. The majority of these girls were 10 to 20 pounds under weight on entrance and the average gain has been a pound a week during the first two months. Only one case has failed to gain consistently and with her there is a question as to whether there is not a beginning pulmonary involvement of both apices. As noted in the text, pulmonary cases do not do well under sun treatment.

characteristic that brunettes pigment more quickly than blondes and that red haired children pigment more slowly than any other type. A certain index to the rapidity with which the sun treatment may be extended is gained through pigmentation. The prognosis is usually better for children who pigment well and this may be entirely apart from the question of the rapidity with which pigmentation takes place.

The programme consists in successively exposing to the sun all the different parts of the body :

The First Day—the exposure should consist of from 1 to 3

REGIME FOR SUN TREATMENT

SURFACE TO BE EXPOSED	PERIODS OF EXPOSURE													
	Three times daily													
	1st Day	2d Day	3d Day	4th Day	5th Day	6th Day	7th Day	8th Day	9th-12th Day	13th-15th Day	16th-20th Day	21st-30th Day		
FEET	3-5 min.	5-10 min.	10-15 min.	15-20 min.	20-25 min.	30 min.	35 min.	40 min.	50-60 min.	60 min.	75 min.	90 min.		
LEGS		3-5 min.	5-10 min.	10-15 min.	15-20 min.	20-25 min.	30 min.	35 min.	40-60 min.	60 min.	75 min.	90 min.		
THIGHS			3-5 min.	5-10 min.	10-15 min.	15 min.	20 min.	25 min.	30-45 min.	45-60 min.	60 min.	75 min.		
ABDOMEN				3-5 min.	5-10 min.	15 min.	20 min.	25 min.	25-40 min.	40-50 min.	50-60 min.	60-75 min.		
FOREARMS					3-5 min.	5-10 min.	15 min.	20 min.	20-35 min.	35-45 min.	45-60 min.	60-75 min.		
BACK						3-5 min.	10 min.	15 min.	15-30 min.	30-40 min.	40-50 min.	60 min.		
CHEST*							3-5 min.	5-10 min.	15-30 min.	35-50 min.	50-65 min.	65-75 min.		
NECK								3-5 min.	5-20 min.	20-35 min.	35-55 min.	55-75 min.		
TRUNK									30 min.	40 min.	50 min.	60 min.		
HEAD											3-5 min.	5-15 min.		
WHOLE BODY	3-5 min.	5-10 min.	10-15 min.	15-20 min.	20-25 min.	30 min.	35 min.	40 min.	40-50 min.	50-60 min.	60-75 min.	75-90 min.		

*If there is any cardiac disturbance protect the heart.

periods of at least hour intervals of from 3 to 5 minutes each on the feet.

The Second Day—the exposure consists of 1 to 3 periods of hour intervals of 5 to 10 minutes on the feet and 3 to 5 minutes on the legs.

The Third Day—the exposure consists of from 1 to 3 periods at hour intervals, of 10 to 15 minutes to the feet and 5 to 10 minutes to legs, and 3 to 5 minutes to the thighs.

The Fourth Day—the total exposure consists of from 1 to 3 periods of at least hour intervals of from 15 to 20 minutes to the feet, 10 to 15 minutes to the legs, 5 to 10 to the thighs and 3 to 5 to the abdomen.

The Fifth Day—the total exposure consists of from 1 to 3 periods of at least hour intervals of from 20 to 25 minutes on the feet, 15 to 20 on the legs, 10 to 15 on the thighs, 5 to 10 on the abdomen, 3 to 5 on the forearms.

The Sixth Day—the total exposure consists of from 1 to 3 periods of at least hour intervals of $\frac{1}{2}$ hour to the feet, 20 minutes to the legs, 15 to the thighs, 10 to the abdomen, 5 to 10 to the forearms, and begin a 3 to 5 minute exposure to the back.

The Seventh Day—increase the 6th day exposures by 5 minutes to each part, same number of periods at same interval and begin a 3 to 5 minute exposure to the chest, the total exposure being 45 minutes. If there is any cardiac disturbance, protect the region of the heart.

The Eighth Day—the total exposure consists of 3 periods at intervals of $\frac{3}{4}$ of an hour, exposing the back 15 minutes, chest from 5 to 10 minutes and beginning a 3 to 5 minute exposure of neck.

From Ninth to Twelfth Day—the total exposure consists of the same periods at same intervals, with $\frac{1}{2}$ hour exposure of trunk.

From Twelfth Day to Fifteenth Day—the total exposure consists of the progressively increasing periods of 1 hour duration. The intervening periods between exposures should decrease until the child can stay exposed most of the clear sunny part of the day.

From the Fifteenth to the Twentieth Day—the total exposure consists of same periods of one hour and a quarter each, with $\frac{3}{4}$ of an hour for the trunk.

From the Twentieth to the Thirtieth Day—the total exposure consists of same periods, of one hour and a half each with 1 hour for the trunk. Short exposures for the head can now be begun. Children vary a great deal as to the amount of direct sun they can endure on their heads at one time.

According to this programme, by the end of the first month the patient can remain in the sun from 3 to 5 hours a day. By the end of the third month, he can remain from 5 to 8 hours both summer and winter without the exposure producing the slightest malaise. After the children have become accustomed to the sun and have become pigmented, they do not have to lie in one position but can carry on their play, the nurse or mother having them change their position so that all parts of the body receive their proportionate share of the direct rays of the sun. My own experience with sun treatment, as part of an entire regimen, includes the following types of cases. Infants, with chronic intestinal indigestion, have had more rapid recovery from the inclusion of the sun treatment along with proper diet. Infants and children with subacute, or chronic tracheobronchial adenitis, some with positive von Pirquets, and some with negative, react well to sun treatment. Some of these cases come from tuberculous homes, others follow acute respiratory infections which have left persistent bronchial glands. These children are markedly undernourished. These are the cases that are often considered tuberculous; whether they are or not is difficult of positive determination. They at least furnish the best possible soil in which the tubercle bacillus may become active. Therefore their treatment, whether from a curative or preventive standpoint, is most vital to the individual, and important to the family. These cases are often complicated with cervical adenitis of varying degrees, or with general adenopathy. The sun treatment is very effective in the cases with superficial glandular involvement. Cases of tuberculous peritonitis, in which there is not an excessive amount of fluid, do well with sun treatment alone, without operation. Where there is an excessive amount of fluid, my experience has been that it is better to operate first and carry on the sun treatment after the distention has been relieved.

As an adjuvant to the rest treatment in cardiac cases, I have found that the sun treatment increases the tone of the muscular system, if used with care. In cases of simple malnutrition and under nourishment I believe sun treatment has a place in the regimen.

As a part of preventorium treatment, for children with



FIG. 2.—Showing the less abbreviated suits which we have termed "nature suits." These are light and airy and can be worn in the suburbs and with the short sleeves can even be worn to school as these children do at the present time.

tuberculous infection, it has a very definite place. I have had no experience of its use in orthopedic or surgical cases nor in cases of pulmonary tuberculosis.

The appended protocols are examples of various types from my own practice and from Sunshine Preventorium run by the California Tuberculosis Association, of which I have the supervision:—

Case A.—Chronic intestinal indigestion with atrophy. Child

only weighed 17 pounds when first seen at the age of 14½ months. With combined feeding, hygiene and sun treatment, he gained 7 pounds in 28 weeks.

Case B.—Diffuse bronchial gland involvement, adenitis, not tuberculous, and a subacute endocarditis following a tonsillar infection. After removal of tonsils and adenoids and careful regimen, rest, diet and sun baths, gained ¾ of a pound a week regularly during period of treatment.

Case C.—Chronic intestinal indigestion, cyclic vomiting, with moderate bronchial gland involvement and malnutrition. Under careful regimen, diet, rest and sun baths, progressed more satisfactorily than the average case without sun baths.

Case D.—This boy who was in the poorest condition at the beginning of the treatment, weighing 46½ pounds at the age of 7 years and 10 months, weighed 70 pounds six months later, a gain of 23½ pounds in 28 weeks.

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THE DURATION OF BREAST FEEDING IN ONE THOUSAND CASES FROM PRIVATE PRACTICE.*

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Seattle.

This series represents replies obtained from a thousand mothers during the course of routine history obtained in the office or in the home of private patients. They are taken from the files in alphabetical order and extend over a period of 10 years. No doubt a much larger series could have been obtained, but for the purposes of convenience in figuring percentages an even number was chosen and 1,000 would appear a sufficiently large number to represent the probable average of even a far larger number of cases.

Numerous papers have appeared in foreign countries and in our own country on this subject, which shows the lively interest still maintained in it, because of its close association with infant mortality. There are practically no references to the literature in this article, since this feature has been admirably covered by Griffith¹, in 1912, Mitchell², in 1916, and others. The number of papers bearing on this subject since that time have been relatively few. In the previous published reports on the duration of breast feeding in America, in which the series have seldom been larger than in this instance, the groups were largely those in eastern cities.

It has always been of interest to me to know how favorably the nursing period of babies living in a community receiving all the natural advantages of low infant mortality, such as that enjoyed by the cities lying west of the Cascade Range, would compare with larger congested communities in our eastern coast cities.

Other features than the duration of breast feeding brought out in the routine history, which might be of interest, as some statistics on the character of labor, whether or not the baby was full time or premature, are included. Of the 1,000 babies, 950 or 95 per cent. were born at full time; 50 or 5 per cent. were prematures; 37 or 3.7 per cent. at 8 months; 13 or 1.3 per cent. at 7 months.

*Read before the King County Medical Society, Seattle, Washington, November 3, 1919.

CHARACTER OF LABOR

Normal labor	832, or 83.2 per cent.
Instrumental delivery	126, or 12.6 per cent.
Breech delivery	21, or 2.1 per cent.
Twins	15, or 1.5 per cent.
Caesarean section	6, or .6 per cent.

This table conforms in general with those given in the text books on obstetrics on the relation of normal to abnormal labor, although the number of breech deliveries is rather low. Pinard³ gives the number of breech deliveries in several hundred thousand cases as 3.3 per cent. An interesting feature is the small number of Caesarean sections encountered, in view of the fact that there is a general feeling that this is a very common operation. Had the series included only the last 5 years, the percentage of Caesarean sections would have been a little higher. So far as this community is concerned I think it might be safely said that the Caesarean section is rarely done except by a relative few who are thoroughly acquainted with its indications and its procedure.

THE DURATION OF BREAST FEEDING: It is to be borne in mind that these statistics are not from the poorer class of city women, but make up in general a group who have had for several years repeatedly placed before them the value of breast feeding in its relation to infant mortality. The mothers represent, in the main, young women of more than average intelligence and training.

A little over 70 per cent. of those children whose ages were given were over 9 months before they came to me for advice. In view of these facts, the series should represent a longer period of breast feeding than that encountered in out-patient departments among the poor of the hospitals situated in the larger congested districts of eastern cities.

The duration of nursing months in this series is as follows:

TABLE I.

DURATION OF NURSING MONTHS.		DURATION OF NURSING MONTHS.	
	AVERAGE PERCENTAGES.		AVERAGE PERCENTAGES.
Less than 1 week ...	81—8.1%	1 month	79—7.9%
1 week	18—1.8%	2 months	92—9.2%
2 weeks	40—4.0%	3 "	98—9.8%
3 weeks	49—4.9%	4 "	63—6.3%

AVERAGE PERCENTAGES.		AVERAGE PERCENTAGES.	
5 months.....	68—6.8%	15 months	8— .8%
6 “	55—5.5%	16 “	4— .4%
7 “	47—4.7%	17 “	2— .2%
8 “	42—4.2%	18 “	9— .9%
9 “	75—7.5%	19 “	1— .1%
10 “	45—4.5%	20 “	1— .1%
11 “	30—3.0%	21 “	1— .1%
12 “	61—6.1%	22 “	1— .1%
13 “	17—1.7%	24 “	1— .1%
14 “	10—1.0%	30 “	1— .1%
		36 “	1— .1%

For the purpose of comparing this series, in which the mothers were of more than average intelligence, with that in which the mothers were of the poorer class of city women, a table has been made similar to that of Mitchell's in his statements of 2,819 mothers at the Children's Hospital in Philadelphia.

TABLE II.

	Nursed not at all	Nursed 1 week or longer	Nursed 3 months or longer	Nursed 6 months or longer	Nursed 9 months or longer	Nursed 1 year or longer	Nursed 18 months or longer	Nursed 2 years or longer
Mitchell's series, 2,819 cases	20%	80%	55%	42%	34%	27%	9%	2%
Manning's series 1,000 cases.....	8.1%	91.9%	64%	41%	26.8%	11.8%	1.6%	.3%

It can be observed from a perusal of this table that there is a far greater proportion of mothers nursing their babies in my series up to and during the first 3 months than in Mitchell's series. At about 6 months they are practically the same and from 6 months up there is a rapid falling off in the percentage of nursing months as compared with those poorer women of dispensary patients in the above series. It can be further observed that in the case of the dispensary mothers the percentage nursing 18 months or longer is higher, no doubt owing to the fact that probably there are many foreigners among them whom I think make up the majority of those mothers who nurse their babies for excessively long periods.

It would be of further interest to make a comparison between these series and some more or less similar groups taken from private practice in other geographic sections of the United States

and Canada; and for this purpose I have chosen the following groups: Koplik's series⁴ of 1,007 cases in private practice in New York City; Sedgwick's⁵ series which includes the replies obtained by addressing a questionnaire to some of the married physicians in the United States; and a series of Brown's⁶ of Toronto of 633 cases from private practice.

TABLE III.

	Nursed 1 month or longer	Nursed 3 months or longer	Nursed 4 months or longer	Nursed 6 months or longer	Nursed 9 months or longer
Koplik's series, 1,007 cases Private practice.....			40%		
Sedgwick's series, wives of physicians		80%			
Brown's series, private cases, 633.....		76%		46.7%	30.4%
Manning's series, 1,000....		64.1%	54.3%	41%	26.8%

As would naturally be expected, Sedgwick's series shows the highest percentage of breast fed babies during the first 3 months. In view of the fact that his questionnaire was addressed only to wives of physicians such would be the case, for no mothers could be in a better position to realize the importance of breast feeding than the wives of physicians. The other 3 groups are quite similar in the duration of nursing months. I realize that no very definite conclusions of a comparative nature, other than that in a general way they are similar, can be drawn from such a table. Comparison with a much larger group of reports has so many statistical difficulties in the way of arrangements, as to practically exclude any comparison in tabular form. In general it would appear from the above table, if any conclusion could be drawn from it, that the babies in private practice in Seattle are nursed about the same period of time that they are in Toronto and New York. The nursing period of mothers living in Seattle is apparently not greatly influenced, at any rate during the first 4 months, by the fact that local geographical and climatological conditions are favorable for low infant mortality.

Of 192 cases in which the babies were nursed over a period longer than 10 months, there are a large group of foreigners and not a few Americans. The few of these Americans were those

living, in the most part, in more or less isolated communities where the milk supply was not under supervision, and as considered the safest procedure the baby was kept on the breast. Of those excessively long nursing months, some 16 to 36 months, there are a large proportion of Japanese among whom even in the better mercantile class of Japanese in Seattle it is customary to nurse the baby 1 year and sometimes longer. More and more of recent years, through contact with Americans, this is ceasing to be so general.

REASONS GIVEN FOR TAKING THE BABY OFF THE BREAST: These are divided into 3 groups; first, inability on the part of the mother; second, inability on the part of the baby; and third, other reasons, under which I have grouped several which are not so clear and definite indications for taking the baby off the breast as in the other 2 groups.

Inability on the Part of the Mother: Sepsis, tuberculosis, influenza, anemia, infected gall bladder, pneumonia, pyelitis, convulsions, eclampsia, breast abscess, and excessively high fever of protracted nature and death of the mother were some reasons given in the first group. One cannot have any choice in the matter in some of these conditions, as tuberculosis in the mother or death of the mother. In many acute infections in the mother, however, the baby can be kept entirely on the breast. In most of these other conditions, part or complete breast feedings can be continued to advantage after the acute period has subsided. In eclampsia I have repeatedly been able to get the baby back on the breast after albumen had disappeared from the urine. In a similar way in threatened eclampsia, where a Caesarean section has been done, it has not been difficult to place the baby back on the breast after the toxemia has disappeared and the mother's convalescence from the operation has progressed favorably enough to permit nursing with complete satisfaction to the mother and in the nursing results. There was one instance of a breast abscess 2 weeks before the baby was born. Not a few of the babies taken off the breast, owing to a severe influenza or pneumonia in the mother, where the influenza was just prior to or at the time of birth, were most difficult to feed. In many instances it was possible to re-establish breast feedings in part or entirely 4 to 6 weeks after the acute illness without detriment to the

mother's condition. Secondary anemias of the mother with a tendency to persist appear to be a possible indication for weaning. There have been a few instances in which big, fat babies were gaining at the rate of 1 ounce a day, while small anemic women, excreting an abundance of milk, were obviously losing in weight and in strength. In some instances one might be justified in attempting some bottle feedings in place of some of the breast feedings, but this should be done only with the advice and consent of the obstetrician or attending physician, since many women of this type ignore altogether their own health and seem obsessed in the idea that the baby must be nursed.

Inability on the Part of the Baby: There is a small group in this series where owing to a developmental defect, as for example, hairlip or tumor of the tongue, nursing at the breast is made impossible or extremely difficult; and again a group where cerebral hemorrhage has occurred, the baby is unable to nurse for a shorter or longer period of time. In a certain number of these instances perhaps enough breast milk may be obtained from the mother to make possible a gain with supplemental feeding, but in most instances of this sort the deep ducts of the breast are never emptied and the superficial ducts are only slightly emptied, for the stimulation of the baby alone at the breast is not sufficient to prevent the closing of the ducts. In these instances, where the degree of coöperation is insufficient, stripping of the breast, as described by Sedgwick⁷, and more recently by Moore⁸, may be resorted to with better results than any other method. In most instances premature babies were able to nurse the breast within the first week or two.

Other Reasons Given by the Mother for Taking the Baby off the Breast: This includes a large group which constitutes a source of perplexity to all physicians dealing with this subject, since unquestionably many women who give up nursing could nurse the baby longer and a certain number are probably unable to do so under any condition. It is so difficult to tell which one could keep the baby on the breast with the proper encouragement, the proper advice, and an environment in which everything was favorable to the breast feeding, where the technique of breast feeding was appreciated and understood.

Inverted or retracted nipple was one of the reasons given in

this group; this undoubtedly depends on the degree of retraction and under certain conditions precludes any possibility of nursing of the breast. In not a few instances, with splendid coöperation on the part of an interested nurse and a willing mother, enough breast milk may be obtained in this manner to give at least partly breast feedings. Cracked nipple is a frequent reason given. Not enough attention is paid to the care of nipples during pregnancy. Not a few women reach confinement with little or nothing said to them about the care of their breasts. In many instances the condition may be improved sufficiently to permit the baby being placed again on the breast with sufficient perseverance and intelligent care, and the putting up with more or less pain on the part of the mother. In such instances, however, where the mother's life is made miserable by the torture of nursing the baby and every care and detail given to place the breast in good condition has been unsuccessful, the baby may be weaned temporarily or permanently. Not a few gave as reasons congested breasts. This is obviously not an indication for permanent weaning of the baby. There was a large group who gave as reasons, no milk, weak milk, vomiting, baby refused to nurse, milk dried up, colic, no gain, and eczema in the baby. Undoubtedly this latter group is the one where certainly much can be done to extend the nursing period. Sedgwick's series demonstrates that the wives of physicians of the United States in 80 per cent. of the instances nurse their babies 3 months or longer. These women differ from those in this series only in the fact that they have been taught to realize the importance of breast feeding, and have been encouraged in it by someone in whom they have confidence and by someone who is in a position to exert a forceful influence. Patients receive such conflicting information in regard to feeding the infant, not only from well meaning neighbors, but often from nurses who know nothing about the technique of breast feeding, stripping of the breast or the various means which may be resorted to in supplementing the breast, and also by doctors who through ignorance or lack of time are unwilling to go into the minute details and care necessary to make a thorough trial. Contributing to this difficulty is the fact that there is no one way of feeding the baby after it is off the breast. Every one has seen some baby do well weaned onto some sort of feeding. The fundamental idea I wish to convey at this time as the most important

feature of this paper is to *utilize all the breast milk there is, no matter how small at the time, and then if necessary supplement the breast with the bottle.* This requires patience and coöperation in which one must absolutely dominate the situation. In a group of 127 reasons of this character, there were some 56 who said that they had had no breast milk within the first few weeks and for this reason weaned the baby, and 14 abandoned the breast during the first week. The permanent discontinuance of breast feeding, owing to insufficient supply or no milk during the first week of life, is either due to ignorance or neglect on the part of the attending physician. Colic is not an infrequent reason given for weaning. Too much attention is paid to the character of the stools in breast fed babies. Curds and mucus are a frequent accompaniment of colic and may often be an evidence of over feeding. In most instances the less done the better to a colicky, breast fed baby, which is gaining to regulate stools containing mucus and curds. Vomiting is not an infrequent reason given for weaning the baby. Suffice it to say that in most of these instances nothing is gained by taking the baby off the breast. In most cases, where vomiting of breast milk of the pyloric spasm type of vomiting persists I have found the administrations of the thick cereal, one tablespoonful four times a day before feeding, for a shorter or longer period, a distinct contribution to the treatment of this sort of case, making possible the continuance of breast feeding. Eczema is occasionally given as a reason for weaning. As likely as not an eczema may be worse and the nutrition much worse on weaning, to the bitter disappointment of all. I believe with Zahorsky that it is wrong to condemn physicians generally. Most physicians do try to keep the baby on the breast. However, if 80 per cent. of physicians' wives can nurse 1 or more babies, 3 months or longer, and their private patients do not, more persistency on the part of the physician together with a better understanding of how to utilize what breast milk there is, is needed, no matter how little it may be at the time. It is a vital problem in which physicians must take the leading part. The general educational publicity of a national character through various organizations, which has so vigorously placed before mothers of the land the value of breast feeding, has been of great assistance and must be continued. It is gratifying in my own experience to encounter a uniform desire on the part of mothers to nurse their babies

and a feeling of bitter disappointment when, in the early months, it seems advisable to supplement it. In the entire series there was but 1 mother who refused to put the baby to the breast.

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AUTOGENOUS VACCINES IN TREATMENT OF CHRONIC NASAL CATARRH (British Medical Journal, Aug. 9, 1919). The cases on which L. Mackey's paper is based concerned patients suffering from (1) recurrent acute nasal catarrh, (2) chronic nasal catarrh or (3) chronic postnasal catarrh. Mackey always uses an auto-genous vaccine. The vaccines were made from the germ or germs which he believed to be responsible, and always from the primary cultures when these were pure. Mixed vaccines were made when two or more germs grew profusely on the plates, or when, as sometimes happened, a different infection was found in the two nasal passages. The vaccine most frequently used was pneumococcus, either pure or combined with some other germ, and the next on the list was Pfeiffer's influenza bacillus; then *M. catarrhalis*, *Staphylococcus aureus*, *Streptococcus mucosus*, *B. mucosus-capsulatus* (Friedländer's), and, last of all, *B. Septus* and *B. coryzae-segmentosus*. The vaccines were made in such strengths that 20 minims represented the maximum dose. Mackey began with 4 or 5 minims and gradually increased the dose, giving twelve doses at intervals of a week. The maximum dose of pneumococcus and streptococcus used was always 150 millions for an adult and for the other germs 300 or 400 millions. In one-half the cases the catarrh was cured and the nasal passages were normally sterile. In about one-third of the cases the catarrh persisted in a modified degree.—*Journal A. M. A.*

THE VALUE OF LUETIN IN AN OUTPATIENT DEPARTMENT*

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Because of the apparent difficulty in diagnosing many cases of congenital lues from an outpatient standpoint, especially the latent type, a luetin test was made on every child that gave the slightest suspicion of the disease, either from the history or the physical examination, and all were checked by the Wassermann reaction. Errors in diagnosing this type of lues happen to all who see a great many cases, especially if a routine blood-serum examination is not done, and even then, too many negative reports are returned to us from the laboratory. As if this were not a sufficient handicap, we are now and then confronted by an incorrect positive report, as is the experience of many who have their Wassermann tests checked by another laboratory. When we think of the many children of luetic parents struggling toward manhood and womanhood against the ravages of this spirochetal infection, these possible errors in diagnosis are appalling, especially in the light of the advances made in the therapy of this disease. Simply because their blood-serum is negative, we take it for granted that they are non-luetic and pass them by, only to be confronted by them a few years later with an acute interstitial keratitis or other manifestations of active lues.

The day has arrived when we, who pose as being specially interested in pediatrics, should not wait for a Wassermann report before making a diagnosis of lues, or at least a tentative one, just as a surgeon should suspect a fractured bone before he sees the x-ray. It is quite true that many apparently show no luetic stigmata, but a carefully recorded history, even in the presence of what seems to be a negative physical examination, will often throw enough light to cast some suspicion of lues. However, it is my firm belief that every case of hereditary lues, whether active or latent, will show some stigmata of abnormal development, if we could only appreciate them. With this feeling in mind, a Wassermann and luetin test were made on every child who could not score 100 from a developmental standpoint. The

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reason for their coming to the clinic, as well as the suspicious points in their history or physical examination, were noted.

Divers opinions are held as to the value of luetin as a diagnostic aid in congenital lues. In 1912, Noguchi¹ reported that the luetin reaction was present in the majority of latent and hereditary lues, and that it was of great prognostic value because of its presence after the Wassermann and clinical signs had disappeared. Orleman-Robinson² found that the luetin reaction was more constant in tertiary and latent hereditary lues than the Wassermann. Cohen³ noted that the cutaneous test agreed with both the Wassermann and the clinical signs. Nanu-Muscel⁴ concluded that the luetin reaction of Noguchi was positive in 71 per cent. of congenitalluetics. S. Cannata⁵ observed that in 17 out of 51 cases less than a year old, and with positive signs of lues, the skin test was negative, while the Wassermann was negative in 35. In older children, the 2 tests paralleled each other more closely. Grulee⁶ thought that the luetin test had a distinctly negative value, inasmuch as in all cases not luetic the reaction was negative. Wolfsohn⁷ decided that luetin was especially valuable in the diagnosis of parasyphilis, tertiary and latent hereditary lues. Cordon⁸ obtained a positive test in 81 per cent. of his congenital cases and a negative test in all the non-luetic ones. Noguchi,⁹ in a later article, reported that in primary lues the reaction was positive in about 30 per cent. of the cases, the reaction was mild; in secondary lues it was positive in 47 per cent. of the cases, the reaction being very slight; in tertiary lues it was positive in 80 per cent. of the cases, the reaction was severe, and usually pustular; in congenital lues it was positive in 70 per cent. of the cases, the reaction being more severe after treatment; it was more frequently positive in late congenital lues than in the newborn; in syphilis of the nervous system, it was positive in 60 per cent. of the cases; in visceral lues it was positive in 90 per cent. of the cases; that the luetin reaction indicated an allergy, while the Wassermann manifests an active syphilitic process. Sherrick¹⁰ showed that a positive reaction could be obtained in 99 per cent. of all cases by the administration of potassium iodide with, or shortly before, or after the intradermal test; that other substances, e. g., starch, agar, etc., will give the same reaction when potassium is given; that other drugs containing iodine have a similar influence on the luetin reaction. Lyons¹¹ verified Sher-

rick's work. Churchill and Austin¹² found the luetin test to be of little diagnostic value, although written directions from Noguchi were carefully followed. DeBuys and Landford¹³ believe that the Wassermann reaction is not so valuable as the luetin test in cases of hereditary syphilis; and while they believe that the luetin test is of more value in being more often positive than the Wassermann, they do not believe that it should displace the Wassermann, as both tests serve distinct purposes, the former indicating an existing syphilitic condition, even though it be inactive, while the latter gives evidence of the presence of antibodies in the circulation, indicating an active process. Rytina's¹⁴ conclusions are that in congenital, latent and tertiary syphilis the luetin reaction is practically 100 per cent. positive. Brown's¹⁵ observations on 134 cases resulted in nearly 90 per cent. of the congenital luetics reacting positively to luetin.

Of the 168 cases tested, 61 per cent. were males and 39 per cent. females. Among them was a Chinese boy of 18 years. The oldest child was 18 years old and the youngest was 7 weeks. Several of the parents were injected, and the number of positive reactions was about 10 per cent. higher than the congenital cases.

COMPARISON OF THE LUETIN AND WASSERMANN
REACTION IN CHILDREN

Wassermann	Luetin	Per cent.
+	+	17.8
—	+	47.6
+	—	.0
—	—	28.5
Incomplete reactions		6.1

The total number of positive reactions was 65.4 per cent. as compared with 70 per cent. which is about the average obtained by most observers. Undoubtedly, our number would have been closer to 70 per cent. had our number of incomplete reactions been smaller, (I have recorded all who failed to return after 48 hours as "incomplete"). In practically every case that gave a positive luetin test, there was something in the physical findings or the history indicative of syphilis. The family history suggested lues in over 35 per cent. of the cases, while 30 per cent. were diagnosed from the clinical findings. Among the

positive reactions, there were 4 cases of epilepsy, 1 case of mental insufficiency, 1 case of orthostatic albuminuria, 1 case in which the teeth did not begin to erupt until the fifteenth month, and 1 case in which there was a hernia through an abdominal scar.

COMPARISON OF PARENTS' WASSERMANN AND LUETIN REACTIONS

	Wassermann	Wassermann	Luetin	Luetin
Mother	+ (17)	— (22)	+ (12)	— (4)
Father	+ (3)	— (6)	+ (3)	— (1)

It is interesting to note that 75 per cent. of the luetin tests done on the parents were positive, while only 41 per cent. of the Wassermann tests were positive.

COMPARISON OF CHILD'S WASSERMANN AND LUETIN REACTION WITH THAT OF PARENTS

Child's Wassermann	Child's Luetin	Parents' Wassermann	Parents' Luetin	No.
+	+	+	+	3
—	—	—		5
—	+	+		5
—	—	+		2
—	+	—	+	5
+	+	—	+	3
—	+	—		6
+	+	+		1
—	+	+	+	1
Total				31

Case 40,911 came to the clinic complaining of a hordeolum, ear-ache and anorexia. He was 9 years of age. The Wassermann reaction of both father and mother was positive. The child was 26 kilograms in weight and 132 centimeters in height (about 2½ kilograms underweight for his height.) He had a bilateral ptosis, teeth were serrated, but not Hutchinson's type; the cervical, posterior auricular, axillary and epitrochlear glands were palpable. Mother's sister and cousin were said to have had melancholia. His Wassermann reaction was negative. The cutaneous test read as follows: "After 48 hours there was slight induration and discoloration, but not papular." The child did not report for a further reading, as was customary for all upon

SUSPICIOUS CASES GIVING A NEGATIVE WASSERMANN AND
LUETIN REACTION

No.	Age	Reason for coming to clinic	Reason for taking W. and L.	Physical Findings	Development
44348	7 yrs.	Gen'l Exam.	Under weight	Negative	Normal
40880	5 "	To have blood tested	Father supposed to have lues	Cerv. & axill. adn. prep. adhesions	Normal
37961	15 "	Tumor of palate	Necrosis of palate. 3 miscarriages	Impacted tooth Orthostat. album.	Normal
40869	13 "	Headache, diplopia, insomnia	History of paralysis of father	Sl. int. strabismus.	Normal
40230	6 "	Mental and physical insufficiency	Physical retardation	Albuminuria Int. strabismus; cleft palate; 8 lbs. underweight	Retarded
38522	5 "	To have blood tested	Father supposed to have lues	Negative	Normal
40911*	" "	"	"	"	"
38661*	" "	"	"	"	"
41390	8 "	Nervousness	Convulsions up to one year ago	Negative	Normal
46332	13 "	Temper	Mother had one miscarriage	Negative	Normal
46341	14 "	Mentally backward	Imbecility	Negative	Retarded
43181	7 "	Mental retardation	"	Teeth irregular	Retarded
38645	7 "	Underweight	Mother nervous and hysterical	Mod. adenitis	Normal
40782	6 "	Vaginitis	Grandfather died of softening of brain	Vag. discharge	Normal
29191	7 "	Gen'l exam.	Mother had 4 miscarriages	6 lbs. underweight	Normal
42531	6 "	Gen'l exam.	Father treated in nerve clinic	Negative	Normal
41604	15 "	Enuresis	Mental retardation	Urine, acid	Normal
24986	13 "	Abscess of leg	+ Wassermann of brother 4 years old	Abscess lower leg	Normal
39241	8 "	Gen'l exam.	Mother wished tests done	Negative	Normal
37948	4 "	Mental retardation	Imbecility. Petit mal	Reflexes sluggish. Irregular teeth	Retarded
37067	10 "	Weakness	Underweight	Systolic murmur	Normal
34473	3 "	Cannot walk or talk	Lack of sphincter control; miscarriage	Gen'l adenitis	Retarded
42783	9 "	Pain in temporal region	Mother wished to have blood tested	Carious teeth. Mod. adenitis	Normal
36141	9 "	Convulsions	Convulsions. Birth weight 3½ lbs.	Hyp. tons. adn.	Normal
41644	16 "	Epilepsy	Father had paralysis	Underweight 16 lbs.	Normal
28245	8 "	Nervousness	Secondary anemia	Mod. adenitis	Normal
39619	14 "	Gen'l exam.	2 children died at birth	Hyp. tons. & adn.	Normal
42956	6 "	Exam. for tons. adn.	Began to talk at 3 yrs.	Hyp. tons. & adn.	Normal
42050	12 "	Inflamed eyes	Interst. keratitis	Interst. keratitis	Normal
37579	18 "	Discharging sinus	Bone destruction	Osteomyelitis of digital phalanx. Von Pirquet	Normal
43832	7 "	Mental retardation	Mother has melancholia. Grandfather dead (insane asylum)	Gen'l adenitis	Retarded
36789	3 "	Lump on spine	Underweight	Dorsal Pott's disease	Normal
40296	6 "	Below par	General adenitis	Hyp. tons. Adn.	Normal
41787	7 "	Gen'l exam.	Abortions; miscarriage (?)	Albuminuria	Normal
41889	10 "	Discharging sinus	Bone destruction	Osteomyelitis	Normal
40279	12 "	Mental retardation	Mother very nervous. Pain in fraorb. region	Hyp. tons. adn.	Retarded
45314	8 "	Int. strabismus	Int. strabismus	Int. strabismus	Normal
43857	9 "	Gen'l exam.	Suspicious family hist.	Carious teeth	Normal
50251	13 "	Poor memory—4th Gr.	Father died aneurysm	Negative	Retarded
10803	12 "	Boils	Irregularity pupils	Furuncles	Normal
7284	6 "	Cannot talk or walk	Question of cerebral involvement	Partial reaction of degeneration	Retarded

whom the test was made. It is quite possible that this may have been a case of "delayed reaction."

Case 38,661 came for a physical examination because of a triple positive Wassermann in the mother's blood. The mother had 1 miscarriage (spontaneous) at 4 months after birth of patient. He was 15 years old, 88 pounds in weight, and 61 inches in height (16 pounds underweight for his height). His von Pirquet and Wassermann reactions were negative. His luetin test read as follows: "After 48 hours there was very slight redness, induration and slightly papular." In 1 week the reaction was distinctly negative. It was also negative after 3 weeks. This was the only other case that gave a negative luetin test where a positive Wassermann had been obtained in the parent's blood, but when we consider the age of the child, it is more than likely the parents were infected after the birth of the child. This would then account for the negative reaction of both tests.

The cases giving a negative Wassermann and luetin reaction are set forth below, also their reason for coming to the clinic, for suspecting lues, their chief physical findings and their development.

Case 42,050 might also be open to question because of the diagnosis, but, while practically every case of interstitial keratitis in childhood has a luetic base, it is possible, as it is in the case of adults, to be non-luetic. The Wassermann reaction of both child and mother was negative. No blood test was done on the father. One would also expect to obtain positive results from the Wassermann and luetin in Case 24,986 because a younger brother of 4 years reacted positively in both, but the same argument may be applied to this case as was given for Case 38,661. A "delayed reaction" might account for the negative test in Case 50,251, whose father died of an aneurysm, and whose development was retarded. The child did not report back to the clinic for observation after 1 week.

TYPES OF REACTION: The various reactions to luetin may be grouped under 5 distinct heads; papular, vesiculo-pustular, delayed or torpid, urticarial, and hemorrhagic. The majority were of the papular type. After 48 hours there appeared at the site of injection a definitely indurated papule, measuring from 5 to 12 millimeters in diameter, usually surrounded by a zone of redness, which varied in size. During the next 3 or 4 days the

papule took on a venous blood color, which lasted for a number of days. Notations of this type of reaction were about as follows:

After 2 Days	After 5 Days
Definitely papular, red, and indurated; 10 mm. in diameter.	Papule a dark red color, indurated, zone of redness still present.
Definitely papular and slightly vesicular, indurated. Size 7 mm. in diameter.	Definitely papular and indurated with central discoloration; not tender or painful; 7 mm.
After 10 Days	After 25 Days
Lesion still papular, but induration, size, and zone subsiding.	Papule about one half original size, slightly papular and indurated.
Papular 6 mm. diam. slightly papular and indurated. Color fading.	Lesion barely papular, slightly indurated. Size 5 mm.

Over one third were of the pustular type. An indurated papule appears in 2 or 3 days, which soon takes on a vesicular appearance. Central softening occurs and the lesion becomes a pustule, which, after rupturing and discharging its contents, forms a scab. Separation of the scab leaves a pigmented macule, which may persist for a number of weeks.

After 2 Days	After 5 Days
A vesiculo-papule, indurated, zone of redness, size 6 mm. in diameter.	Central softening in lesion of same size, seems pustular.
After 10 Days	After 25 Days
Lesion ruptured, covered with scab, slight induration.	Pigmented area about 7 mm. in diameter.

Several cases gave the delayed or torpid reaction described by Noguchi. The primary papule soon disappears, and simulates a negative reaction. In about 10 or 12 days it reappears and progresses to either a definitely indurated papule or a pustule, after which time it behaves practically the same as the pustular type.

After 2 Days	After 5 Days
Small, indurated papule, moderate induration, slight redness.	Lesion very slightly papular, no induration.
After 10 Days	After 25 Days
Vesicle 8 mm. in diameter, filled with purulent fluid, sl. tenderness.	Lesion covered with scab, and slight zone of redness.

There were only 3 cases of the urticarial type. In about 9 days after the injection, the lesion took on a distinct urticarial form, about 8 mm. in diameter. In a few days it changed to the papular form, with a moderated amount of induration. Only 2 cases of the hemorrhagic type appeared. Instead of the lesion filling with pus, as in the pustular form, it contained a hemorrhagic exudate, which, after breaking, formed a scab as in the pustular type. Several reactions showed a desquamation about the fading papule; others were surrounded by a purplish zone; in one case, 15 days after injection, the lesion became absolutely black, was papular and indurated. The papule of another was encircled by a greenish area. A girl of 10, very nervous in temperament, complained of pain in the chest; also that the lesion was somewhat tender and painful. Another reaction remained pustular for 30 days before rupturing. The most pronounced reaction occurred in a case of phlyctenular conjunctivitis, whose blood gave a positive Wassermann. In 2 days a papule appeared which was about 8 mm. in diameter. This was surrounded by a zone of redness 20 mm. in diameter. The center of the papule had begun to break down, and the lesion was moderately tender. In 1 week the zone of redness had disappeared, leaving a papule about 5 mm. in diameter, which persisted for quite a while.

CLINICAL MANIFESTATIONS AS SHOWN BY OUTPATIENT RECORDS. *Nervous System*: It is interesting to note the comparatively small number of positive Wassermann reactions obtained in conditions pertaining to the nervous system. There were 24 cases of mental retardation, ranging from 3 to 4 years, as shown by the Binet scale, to the stage of idiocy. Of this number, 22 reacted positively to the luetin test and negatively to the Wassermann reaction; 1 had a positive Wassermann and luetin, and 1 had a negative Wassermann and luetin. Of 5 cases

of epilepsy, 2 of which were petit mal, 4 reacted positively to luetin and negatively to the Wassermann. One case of stuttering, 2 mongols, and 1 microcephalic reacted positively only to the luetin, while 2 juvenile paretics and 1 mongol reacted positively to both tests. There were no cases of multiple sclerosis or hemiplegia.

Eyes: The following is a list of the eye affections as noted: inflammation of the eye (conjunctivitis), astigmatism, corneal scar, nystagmus, optic atrophy, exophthalmos, retinitis, chorioretinitis, phlyctenular conjunctivitis, sluggish pupils and no reaction of pupils; there were 2 cases with a mongolian slant, and 2 with slight ptosis; 5 cases of interstitial keratitis; 6 cases of irregular pupils; and 10 cases of marked bilateral ptosis. Cases with ptosis reacted as follows:

	Wassermann	Luetin	No.
Ptosis	+	+	3
"	—	—	2
"	—	+	5
Interstitial keratitis	+	+	4
" "	—	—	1
Optic atrophy	—	—	1
Retinitis	—	—	1
Chorio-retinitis	—	—	1

Ears: The involvement of the ear was not a frequent occurrence. There were 4 cases of otitis media, 2 of which reacted positively to both tests. One case of poor hearing and 2 cases of otitis media reacted positively to luetin but negatively to the Wassermann. One case of deafness reacted negatively to both tests.

Skin and Mucous Membrane: The skin manifestations recorded were none of those typical of lues, the small and large nodular syphilid. The lesions noted were furuncles, rash on the buttocks (a papular dermatitis), eczema of the face, ears and coccyx. The fact that all but one of the cases were past the age of 1 year accounts for the absence of bullous syphiloderms, usually seen at or soon after birth, chiefly on the palms and soles. No gummata were present. With the exception of an ulceration of the tonsil bordering on the mucous membrane, and whose blood

showed a positive Wassermann, no other involvement of the mucous membrane was noted.

Bones and Joints: There were 3 cases of ulceration, 1 of the finger, and 2 of the tibia and ankle, all reacting positively to both tests. There was 1 case of osteomyelitis of the femur which reacted positively only to the luetin, while 1 ulceration of the leg was negative to both tests. A saddle or depressed nose was observed in 8 cases, 5 of which reacted positively only to the luetin, 1 reacted positively to both, 1 was negative to both, and 1 that had a negative luetin gave an anti-complementary Wassermann. Early snuffles were noted in 3 cases, all of whom reacted positively to both tests.

Teeth:

<i>Type</i>	<i>Wassermann</i>	<i>Luetin</i>	<i>No.</i>
Hutchinson	+	+	7
Carious	+	+	2
Carious	—	+	3
Misshaped and irregular.....	—	+	1
Serrated	—	+	1
Pegged and separated incisors..	—	+	1
Irregular	—	+	1

No attention was evidently given to the first molars for the deformity described by Moon¹⁶ or that described by Fournier.¹⁷ It is such a common occurrence for the first molar to be carious that no attention was evidently paid to any abnormality.

Palate: The following observations were made on the palate: high (3 cases), cleft (1 case), a thick, median scar or ridge on the hard palate (3 cases). While ulceration of the soft palate is conceded to be invariably due to lues, very little attention, if any, has been given to the hard palate. In not a few cases of congenital lues, there appears a thick ridge in the median aspect of the hard palate, usually white in appearance, as if it were scar tissue following a necrotic lesion. In 2 of the above cases, it was this symptom upon which the diagnosis of lues was made, and which was confirmed later by a positive Wassermann and luetin test. Other cases of lues, to be reported later, having a positive Wassermann and luetin reaction, showed this abnormality of the hard palate.

Glands: Enlargement of the lymph-glands occurred as follows: cervical (19 cases); axillary (12 cases); epitrochlear (8 cases); inguinal (8 cases); parotid (1 case); submaxillary (1 case); posterior auricular (1 case). In all but 3 cases where the epitrochlear glands were enlarged, the Wassermann was negative, while the luetin was positive; 2 cases reacted positively to both tests. 1 (Case No. 40411) was negative to both tests.

Development: In 6 cases the act of sitting up was delayed, in 1 case until the fifteenth month. Dentition was slow in 16 cases, ranging from 8 to 18 months; many were recorded as "dentition late." Inability to walk at the average time was noted in 20 cases, a few being as old as $3\frac{1}{2}$ years before being able to walk. Speech was delayed in 23 cases, some as late as 4 years.

Miscarriages: A single miscarriage was recorded in 21 cases; 2 in each of 9 cases; 3 in each of 3 cases; 4 in each of 5 cases; 12 in 1 case; a varying number of prematures in 10 cases; still-borns were noted in 3 cases.

Insanity in the Family: One mother, 1 father, 5 aunts and 1 uncle were insane. There was feeble-mindedness on the mother's side of one family. A mother's cousin was insane. The question of feeble-mindedness or insanity or nervousness in the members of a family is of inestimable value in deciding some of our borderline cases. It is just as important to study the family in making a diagnosis of congenital lues as it is the patient, and many a doubtful case will be cleared up by an intensive study of the patient's relations. This does not mean simply a child's father and mother, but his uncles, aunts, cousins, grandparents, brothers, sisters and all should come under the surveillance of the diagnostician.

REASONS FOR COMING TO THE CLINIC: The most important reasons for coming to the clinic were as follows: general examination, blood test, ulcerations, undernourished, retarded mental and physical development, skin rashes, inflamed eyes, otitis media, epilepsy, headache, microcephalus, mongolism, nervousness, Pott's disease, corneal ulcer, gigantism, osteomyelitis, pleurisy, endocarditis, stuttering, lack of sphincteric control, phlyctenular conjunctivitis, hematoma, secondary anemia, hypertrophied tonsils and adenoids, scoliosis, enuresis, pyelitis, temper, thyroid insufficiency, indolent ulcer of the finger, vaginitis, ulceration of the

tonsil, insomnia, furunculosis, impetigo, scabies, hemorrhage from the nose and anorexia. Orthostatic albuminuria was discovered in 2 cases and a condition of hypospadias in 1.

VON PIRQUET REACTION: Fifty-eight of the series failed to react to the tuberculin test; 21 reacted positively to the human, and 18 to the bovine tuberculin; 13 reacted positively to both.

VALUE OF THE LUETIN REACTION: Luetin has a definite place among the armaments of the clinical worker in ruling out congenital syphilis. Conflicting Wassermann reports often leave the diagnostician in a quandary as to the proper handling of a doubtful case. The performance of the test is a simple matter, if care is taken to inject the luetin intracutaneously instead of subcutaneously. There should be no more trouble in reading a doubtful luetin than there is in reading a 1 plus Wassermann, or a serum that is positive with only a cholesterinized antigen. The only advantage is the length of time necessary for the reading of a delayed reaction.

I wish to thank Dr. Noguchi of the Rockefeller Institute for his generous supply of luetin used in this work. Also Miss C. Goodloe for her aid in carrying out many of the tests.

CONCLUSIONS:

1. The luetin test is more reliable in congenital lues than the Wassermann.
2. At least 65 per cent. of congenital luetics will react positively to the test.
3. It causes no constitutional reaction.
4. It is more important to do a routine luetin test in the clinic than the von Pirquet test, providing the material can be obtained.

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RESULTS OF THE EXAMINATION OF A GROUP OF FRENCH CHILDREN

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In a former paper¹, I dealt in a general fashion with the results of the examination of approximately 38,000 French children, representatives of the group of so-called "rapatriés," or repatriated civilian families returning from the invaded districts of France during the recent war. It is now my intention to analyze these findings in a more complete way, in the hope that from this analysis such correlation may be drawn as may be of value and of applicability to pediatric observation in the United States.

Included in the series there will be but 24,505 examinations, which constitute those performed by myself (exclusive of Belgian children) and in which, as a result, any error is constant. The remaining examinations were performed by several observers, E. J. Labbe, M.D., Portland, Oregon and John Baldwin, M.D., Baltimore, Maryland, and such comparative data, in a rough way, as were of value, namely the observations as to nutrition and development, teeth, tonsils, cervical glands, etc. (a group of 38,000 children), appeared in the article to which reference is made above. Further analysis from a standpoint of group-observation would consist in a recording of the development and nutrition, etc., according to age. Such an article would be of great interest in regard to the comparative reaction of the various ages to such privation as was endured during 3 years by this group of children. This paper will appear later in collaboration with these other observers. An analysis by age of one person's findings would be of value for each one of the observations made in this article but would entail too great space and will therefore furnish the material for a further report.

As mentioned previously, the examinations were distinctly superficial, and very hurried. They were intended simply to eliminate the cases of infectious and contagious disease from admission across the frontier. Even the data obtained in this single inspection, however, seemed to hold such possibilities of interest

and of value that a record was kept of each one of the 25,000 cases, and the findings recorded by age. The group of cases was distinctly abnormal in many respects which may thus modify the feasibility of comparative study, and yet the children from the slums of our large cities probably suffer as many drawbacks in their development and in the progress of their nutrition as did the children in invaded France. Poverty can closely stimulate war in its relation to the restrictions placed upon the physical advancement of a child.

In these observations, then, I recorded 6,946, or 28.4 per cent. poorly developed, 5,710, or 23.3 per cent. as fairly well developed, and 11,831, or 48.3 per cent. as well developed. This category and the one following, namely nutrition, are of course in their classification capable of great individual variation and will depend to a certain extent upon the class of patients, and the district of the country as well as the community, in which the observer has received his training. This was probably particularly true in this series since my observation previous to residence in France was practically entirely confined to western children who have been demonstrated as being noticeably larger than, for instance, eastern ones. On the other hand, the graphic representation of the comparative results of various observers in the larger group previously reported¹ will show the averages at least to be approximately the same.

Granting a fairly accurate judgment then, and including the records of nutrition, namely, 8216 or 33.5 per cent. poorly nourished, 8616, or 35.1 per cent. fairly well nourished, and 7671 or 31.4 per cent. well nourished, we have as a result the observation that 51.7 per cent. of these children were below par in development and 68.6 per cent. in nourishment. This fact, namely, that greater evil effects appeared in nourishment than in development will unquestionably be borne out when the observations are analyzed by age, but it will also undoubtedly be found that certain ages suffered much more than others. The reaction was worse in the child under 3 and in the adolescent, the former because of an actual necessarily faulty and limited diet, the latter because of sacrifice for his younger brothers and sisters. This was of course an impression only and may not be proven, since, in the total series of 37,500 children, only 3.7 per cent. ranged in age from 1 day to 3 years, and 14.9 per cent. from 13 to 16

years, while the remainder or 81.4 per cent. were practically evenly distributed between the ages of 3 and 13 years, with a maximum of 9.3 per cent. at 10 years.

In attempting to compare the findings in this group of French children, it is extremely difficult to find an analogous group upon which statistics have been published in this country. Considering them, however, as in the main (over 75 per cent.) school children, we have the observations of Howes,² in an analysis of the physical findings in 2,449 school children in Framingham, Mass. He found 16.6 per cent. anemic, 45.4 per cent. with cervical adenitis, 47.6 per cent. with tonsillar hypertrophy, 12 per cent. with nasal obstruction, 1.2 per cent. with impetigo and 68.6 per cent. with dental caries. In the group of French children, I found 24.6 per cent. anemic, 37.7 per cent. with "large cervical glands," 33.5 per cent. with "palpable cervical glands," a total of 71.2 per cent., which must be the figure for comparison with Howes'. Forty-seven and four-tenths per cent. in my observations showed tonsillar hypertrophy (16.4 per cent. moderate, 31.0 per cent. large), which is surprisingly similar to Howes' figures. Nasal obstruction was only noted to be present in 5.7 per cent. of the cases, although there was nasal infection—coryza and rhinitis—in 18.4 per cent.. Impetigo was found in 2.7 per cent., but the hygiene of these families was necessarily very bad. Among the 25,000, dental caries was only present in 25.1 per cent. (compared to Howes' figures of 68.6 per cent.), which is an interesting commentary on our reputed advancement in the question of mouth hygiene.

In Porter County, Indiana, as the result of an analysis of rural conditions, the Public Health Service³ reports 55.6 per cent. with carious teeth, 11.5 per cent. with adenoids, and 7.8 per cent. with enlarged tonsils. There was also demonstrated 9.3 per cent. of mental defect, the classification being made by the Binet-Simon tests. This is an interesting figure when compared to the one of 1.6 per cent. which was my impression of the amount of probable definite mental defect in the French series (exclusive of gross pathological conditions such as idiocy, etc.).

In the Bulletin of the Chicago School of Sanitary Instruction,⁴ is the report of 75,476 examinations performed on Chicago school children. Of this number, adenoid hypertrophy was present in 5.3 per cent., diseased tonsils in 7.7 per cent., chronic otitis media

in 1.6 per cent. (I found this condition in 0.9 per cent.), and disease of the eyes, exclusive of defective vision, in 9.9 per cent., to be compared to my figure of 5.9 per cent. (including certain nerve lesions). In a report of the medical inspection of the school children in British Columbia⁵ (Dr. C. J. Fagan), 37,591 examinations being made, 14.1 per cent. were found to have enlarged tonsils and 33.6 per cent. dental caries, the latter a higher figure than was noted in France, and distinctly lower than in the United States. On the other hand, Dr. Andrew,⁶ in Glasgow, found 73.6 per cent. of boys with dental caries, and 90 per cent. of girls, among the school children, while Sir Geo. Newman, in London, found in an examination of 1,362,063 children 40 per cent. with caries in London itself and 65 per cent. outside of the city. A more complete catalog of conditions is to be found in some statistics of the Berlin Medical School Inspector for 1913,⁷ in the compilation of which the results of 34,000 examinations were used. There were found in this group, 5.9 per cent. anemic, 1.1 per cent. rachitic, 0.2 per cent. with bone tuberculosis, idiocy in 0.2 per cent., feeble-mindedness in 1.2 per cent., and speech defect in 0.2 per cent., which may be compared to my figures of 24.6 per cent. anemic, 7.5 per cent. rachitic, 0.3 per cent. with bone tuberculosis, 0.1 per cent. with idiocy, 1.6 per cent. mentally defective and 0.1 per cent. with speech defect. The findings of these observers in regard to superficial conditions, such as skin and eye infections, are so small that comparison cannot be made, due to the probability of variation in classification.

Sir Geo. Newman's report for the city of London shows 40 per cent. affected with dental caries, as noted above, 11 per cent. with disease of the nose and throat, 6 per cent. anemic, 4 per cent. with otitis media, and 4 per cent. with skin disease.

From these few reports it will thus be seen that the closest comparison is found in the German children. American and English children on the whole are in better condition. It is of interest that Genevriér and Heuyer,⁸ in May, 1919, report the present condition of the school children in the formerly occupied territories of Northern France, especially the Ardennes, from which particular area a great percentage of the children in my series was drawn, as being very poor, largely as a result of food deficiency. Fifty or sixty per cent. are infected with skin disease, all of them have been retarded at least 18 months in mental

development, and all show a most noticeable evidence of adeno-pathy.

The very wide range of scattered pathological conditions found in these children precludes a table showing them. Nevertheless it may be of interest to specialists that I group certain of the findings under systems or organs, thus giving the possibility of comparison of the frequency of such conditions in this country and in France.

For instance, under the *Eye* were found the following:

Blepharitis	524	Hemorrhage sub-conjunc-	
Cataract congenital bilat-		tival	4
eral	5	Hordeolum	74
Conjunctivitis acute	133	Iridectomy	4
Conjunctivitis chronic...	31	Iritis traumatic	2
Conjunctivitis phlyctenu-		Keratitis acute	34
lar	10	Keratitis interstitial	11
Contusion eyelid	1	Keratoconia	5
Cyst conjunctiva	1	Kerato conjunctivitis....	1
Cyst lachrymal	1	Microphthalmia	4
Cyst palpebral multiple..	3	Nystagmus lateral	9
Dacryocystitis	3	Nystagmus rotatory	2
Destruction eye ophth.		Oedema conjunctival	1
neonat.	1	Opacity Corneal	42
Ectropion	7	Pupils unequal	4
Enucleation eye	11	Pupils excentric.....	2
Epicanthus	11	Ptosis bilateral.....	20
Opacity corneal	42	Ptosis unilateral.....	8
Fibroma conjunctiva ...	1	Sclerotics blue	2
Exophthalmos	106	Strabismus	378
		Ulcer corneal	7

Gross *nerve* and *brain* conditions were as follows:

Chorea, minor	1	Herpes	96
Chorea, major	1	Hydrocephalic head....	74
Chorea post-encephalitic.	1	Hydrocephalus arrested.	10
Deaf mutism	14	Hysterical	113
Defective	421	Idiocy	20
Epilepsy	4	Little's disease	1

Microcephalus	15	Paralysis legs post en-	
Mongoloid	5	cephalitic	5
Oligocephaly	1	Paralysis legs, pseudo	
Paralysis facial cause (?)	8	(rachitic)	1
Paralysis birth, legs.....	2	Speech defect	24
Paralysis legs, poliomye-		Tic, facial	9
litis	11		

Under *internal gland* conditions were noted the following:

Achondroplasia	2	Hyperthyroidism	4
Acromegaly	1	Infantilism lorraine.....	5
Cretinism	2	Macroglossia	1
Cretinoid	3	Myxedema	1
Fingers stubby	38	Obesity	15
Fingers clubbed	26	Over development.....	12
Goitre	223	Prognathism	1

Under *developmental conditions*, the following:

Absence 2nd phalanges..	1	Hypertrophy of gums...	1
Equino varus bilateral...	1	Palate cleft	13
Equino varus unilateral..	6	Palate cleft operated...	2
Cyst branchial.....	1	Spina bifida	1
Cyst thyroglossal.....	1	Stigmata of degenera-	
Deformities, traumatic,		tion	1124
etc.	54	Uvula absence of.....	2
Face asymmetrical.....	659	Uvula adherent.....	1
Fingers malformation...	1	Uvula bifid	206
Fingers webbed.....	1	Uvula clubbed.....	22
Hare lip	2	Uvula deformity of.....	5
Hare lip operated.....	10	Uvula filiform.....	172

Under *skin and subcutaneous condition*, the following:

Abscess scalp	6	Dermatitis impetigenous.	94
Abscess pinna	1	Dermatitis medicamentosa	1
Alopecia areata.....	3	Eczema	127
Alopecia burn.....	1	Furunculosis	12
Burns superficial.....	37	Haematoma birth	1
Contusion eyelid.....	1	Haematoma forearm....	1
Contusion forehead.....	1	Ichthyosis	4
Cyst scalp	1	Infectious superficial....	42
Cyst seborrheic.....	2	Lacerations superficial...	47

Lupus	4	Phlegmon face	1
Lymphangitis	1	Psoriasis circinata.....	2
Naevi, all types.....	53	Scars superficial.....	23
Edema conjunctiva.....	1	Seborrhea capitis.....	18
Edema face cause?.....	1	Seborrhea facialis.....	144
Edema hand traumatic..	1	Tinea capitis	23
Edema legs	5	Urticaria	3
Edema uvula	1	Verrucae all types (ex-	
Paronychia	10	cept)	27
Phlegmon arm	1	Verrucae infantile.....	19

In the observation of 2,503 abnormal children, in other words cases voluntarily appearing at a dispensary for treatment of one type or another, we found,⁹ using certain ones only, for the purpose of comparison, the following conditions:

Anemia	15	Potts disease.....	11
Cervical adenitis.....	119	Verrucae	5
Tonsils & adenoids.....	1100	T. B. of the hip.....	9
Impetigo	28	Polio paralysis.....	11
Scabies	33	Hordeolum	6
Dental caries	243	Hare-lip	2
Speech defect	43	Cleft palate.....	1
Strabismus	46	T. B. of the knee.....	3
Blepharitis	53	T. B. of the ankle.....	3
Conjunctivitis	43		

In a crude way only, a comparison may be drawn therefore between the findings in these different localities, and in tabular form for clarity may allow of the formulation of certain deductions (see table on page following).

From this summary, it is seen that a wide variation exists in the different parts of the world in regard to dental caries. This variation is also apparent in the different parts of our own country. From the standpoint of anemia, not very accurate comparisons may be drawn from the figures cited— a comparable group would necessarily be from a less hygienic environment than any reported. Skin disease was more prevalent in the French series because of necessarily poor hygiene—the same applies to eye disease, which was much higher than that noted anywhere else other than in the California figures, which are of pathological cases entirely.

The large percentage of rachitic manifestations is unquestionably due to the dietary deficiencies during this formative period—it is proven by the reports of the French physicians now working among this same group. The same is true for the frequency of adenopathy, although the rôle of tuberculosis will appear later, in all probability. Bone tuberculosis had approximately an equal frequency in Germany and in France—the in-

Condition						United States			
	France	London	Glasgow	Berlin	Brit. Col.	Chicago	Indiana	Mass.	California (all Path.)
Caries	25.1%	20%	81.8%		33.6%		55.6%	68.6%	9.7%
Dis. of Nose and throat		11%							
Tonsils	47.4%				14.1%	7.7%	7.8%	47.6%	43.9%
Adenoids						5.3%	11.5%		
Anemia	24.6%	6%		5.9%					0.5%
Ch. Ot. Media...	0.1%	4%		0.07%		1.6%			
Skin Dis	7.3%	4%		0.05%				Imp. 1.2%	2.4%
Rachitis	7.5%			1.1%			*		
Bone T. B. C....	0.3%			0.2%					0.8%
Idiocy	0.1%			0.2%					
Feeble minded- ness	1.6%			1.2%			B-S. 9.3%		
Speech Defect...	0.1%			0.2%					1.7%
Eye Dis.....	5.9%			0.1%		9.9%			5.6%
Cerv. Ad.....	71.2%							45.4%	0.5

(True Cervical Adenitis.
Usually T. B. C.)

crease of 0.1 per cent. may have been a result of the war conditions. Idiocy and feeble-mindedness were about equally frequent in the German and French figures. No comparable data are available for this country. The same applies to speech defect.

I think, on the whole, that it will be found a little surprising that greater evil effects of the conditions undergone were not noted—certainly they are not extraordinarily severe.

In conclusion I desire to acknowledge my indebtedness to Dr. P. F. Armand-Delille of the Faculty of Medicine and Physician to the Hospitals of Paris, at one time Major, Medical Corps, French Army, under whose general supervision these examinations were performed.

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PARALYSIS OF THE NECK (*Archives de Médecine des Enfants*, Paris, March, 1919). F. Figueira here presents 6 cases of the "cephaloplegic syndrome" which affects infants and young children, mostly previously healthy. On waking in the morning it is found that the head cannot be held up; it lops forward or backward. In some of the cases there had been a preceding pseudo-grippal catarrhal affection. The tendon reflexes were usually attenuated, and in most of the cases the electric excitability was reduced. This acute and sudden akinesia disappeared in 4 to 10 days, without leaving a trace. All the cases were observed at Rio de Janeiro, and the first coincided with an epidemic of 100 cases of poliomyelitis (1910-1911). Since that time, about 10 or 15 cases of poliomyelitis have been reported there each year. Figueira is inclined to regard the "cephaloplegic syndrome" as an abortive form of poliomyelitis, notwithstanding the lack of an epidemic and the absence of several symptoms usually regarded as testifying to poliomyelitis.—*Journal A. M. A.*

A STUDY OF THE GROWTH OF INFANTS IN SAN FRANCISCO WITH A NEW FORM OF WEIGHT CHART.

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Observation of normal babies over a period of several years in the Children's Clinic and in the more recently formed branch for well babies, the Baby Clinic, of Stanford University Medical School, showed some time ago that the weights of the majority of our well babies were well above the average line of our weight charts (taken from Griffith) and that we were in need of a chart more closely adapted to our own conditions. Accordingly a compilation of weights from our own records has been made and forms the basis of the present study. It has been made in 2 stages; a preliminary compilation, completed 2 years ago, and the present final one, which includes the data of the first. The results of this work, showing that our average weight line is considerably above that of the text books, led us to compare the original figures of other investigators with our own. There is a very large mass of statistics of weight in the first year. Most of these are derived from the clinics and represent the lower economic classes of society, but there are a few studies of weight in the higher economic classes, notably those of Camerer and of Freeman. Table I gives a number of examples.

From the various reports summarized in Table I, it is evident that while birth weights in the classes especially favored by wealth or by heredity (Warren's remarkable figures perhaps represent a fairly pure native pioneer stock) are somewhat higher (about 500 grams) than those in the unfavored classes of mixed heredity found in urban clinics, the weights at the end of the first year present enormous divergences between the different levels. It should further be noted that there are indications that average weight in some places is now higher, at least in the latter half of the first year, in the same economic level than it was a few years ago. The curve given as the average by Holt in the first edition of his "Diseases of Infancy and Childhood," published in 1897,

shows the weight at the end of the year as 20 pounds (9,065 grams); the curve of the sixth edition, published in 1911, shows the weight as 21 pounds (9,520 grams). Our own data, plotted in Figure 1, shows a distinct increase in average weight since 1917.

A word may be said about certain peculiar environmental conditions which have a definite bearing on the well-being of infants in San Francisco. While extreme poverty is unusual, the economic level of our clinic families is not much above minimum subsistence standards. Most of the families by special sacrifice can, however, obtain certified milk for their babies, and the others are helped in this respect by charitable agencies through the Social Service department. The seasonal variation in temperature, the range of daily temperature and the fluctuations of humidity are not extreme (see Figure 3). As a result our babies

TABLE I
Showing first year weights in different localities

Author	Country	City	Birth weight		Six months		One year	
			Boys	Girls	Boys	Girls	Boys	Girls
Robertson ¹	England	Leeds	(3300	3200)	6900		8525	7730
Robertson ¹	England	London	3310	3210	7535		9700	8625
Broudic ²	France	Paris	3130	3020	6800	6720	8950	8900
Gundobin ³	Russia	Petrograd	3558	3380	6900	6300	9970	9300
Robertson ⁴	S. Australia	Adelaide	3590	3410	7730*	7050*	9340*	9080*
Schmid-Monnard ⁵	Germany	Frankfurt	3396	3315			8583	8600
Holt ⁶	U. S. A.	New York	3400	3260	7260	7030	9290	8840
Freeman ⁷	U. S. A.	New York	3965		7850		10535	
Camerer ⁸	Germany	Stuttgart	3480	3240	7650	6920	10210	9660
Warren ⁹	U. S. A.	Portland, Me.	3965	3740				

*Calculated values.

Note: Freeman's figures are based on patients in private practice, and Camerer's figures on breast fed babies of the middle class.

Many of the quoted figures have been translated from the avoirdupois into the metric system.

can with safety be allowed outdoors at an earlier age and for a greater portion of the day than is the case elsewhere. The mean temperature is not high—about 56° F.—ice for refrigeration is not essential and bacterial multiplication in milk even after the bottle has been opened, even in the summer months, is not excessively rapid. Through the efforts of the Milk Commission of the County Medical Society, an extremely high standard of milk purity has been established and strictly maintained. It is not necessary to reduce the food intake in the summer, as it sometimes is during the hot months in the East. The depressing effect of

Comparison of Weight Curves for 1906-1917(---) and 1906-1919(—)

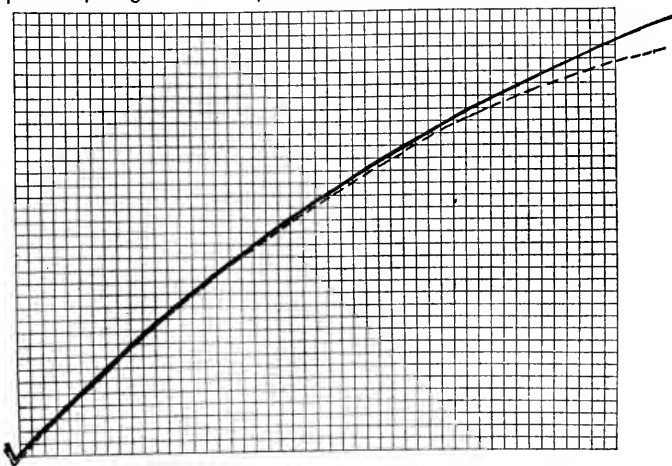


FIGURE 1.

hot weather on appetite is not a factor. Finally, there is an almost complete absence of the severer forms of diarrheal disease of infancy.

Before 1917 the efforts to have well babies brought systematically and regularly to us for weighing and direction of feeding were somewhat desultory and no special day was set aside for them. In 1917, Dr. H. H. Yerington organized the Baby Clinic as a branch of the Children's Clinic intended for well babies only. Mothers of infants born in Lane Hospital or on the Outpatient Obstetrical Service were urged to bring their babies to the Clinic as soon as possible and the advantages of this were explained. When the babies were brought to us they were weighed (without

clothes) and the mothers were instructed in their feeding and care. Breast feeding, or the use of certified milk for babies who could not be nursed, was urged. Cases failing to return were followed up by the Clinic nurse. The Baby Clinic has been largely attended and it has given us a large amount of fresh statistical material. Altogether 5,227 weighings have been collected, of which about two-thirds belong to the period 1906-1917 and the remaining third to the period 1917-1919. These form the basis for the graphic charts herewith presented. The weights are those of all normal, full-term, gaining babies, both breast and bottle fed, born in Lane Hospital or admitted to the Clinic since 1906 whose records have been sufficiently complete for statistical study. Weights at birth and for the succeeding 10 days are from the records of the obstetrical ward of Lane Hospital. The birth weights are those of 644 infants, of whom 329 were boys and 315 girls. The average curve for the first 10 days was made from the charts of 112 babies, 53 boys and 59 girls, who made an uninterrupted initial loss followed by an uninterrupted gain. The maximum and minimum curves for the first 10 days are hypothetical but include all observed cases with 1 exception and follow Hammett's¹⁰ rule that the initial loss is roughly inversely proportional to the birth weight. After the tenth day all weights were totalled and averaged and the maximum and minimum noted for periods of 1 week and the results plotted up to the 91st day. Thereafter, in order to obtain the "smoothing" effect of a sufficiently large number of figures, the weekly totals were combined and averaged as follows: for the 2 weeks period from the 91st to the 105th day, and for 4 weeks periods from the 105th to the 364th days. The average figure was plotted in the middle of the period and the maximum and minimum figures where they actually occurred. The smooth line did not diverge by more than 100 grams from any actual average so plotted. The maximum and minimum curves include 5,205 of the 5,227 observations, or 99.58 per cent., the exceptions being about equally distributed above and below. Outside of very exceptional or "record" cases the curves represent a fair approximation to the range of normal weights in this community. Table II summarizes the weights and Table III the rate of gain by 3 month periods. Both tables are derived from the smooth curve of Figure 2.

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TABLE II
Showing weights by three-month periods

Boys	Birth	3 mos.	6 mos.	9 mos.	12 mos.
Minimum	2225 4' 14"	4200 9' 4"	6300 13' 14"	7775 17' 1"	8875 19' 9"
Mean	3495 7' 11"	5650 12' 7"	7650 18' 14"	9200 20' 5"	10375 22' 14"
Maximum	5300 11' 11"	7725 17' 14"	10175 22' 7"	11600 25' 9"	12500 27' 9"
Girls					
Minimum	2150 4' 12"	4000 8' 13"	6025 13' 5"	7450 16' 7"	8625 19'
Mean	3305 7' 5"	5400 11' 15"	7375 16' 4"	8900 19' 10"	10075 22' 4"
Maximum	4800 10' 10"	7400 16' 5"	9575 21' 2"	10900 24' 1"	11650 25' 11"

TABLE III
Showing weekly rate of gain by three-month periods

Boys	Birth* to 3 mos.	3-6 mos.	6-9 mos.	9-12 mos.
Minimum	168 G. 6 oz.	162 G. 5.7 oz.	117 G. 4.1 oz.	85 G. 3 oz.
Mean	196 G. 7.2 oz.	154 G. 5.4 oz.	119 G. 4.2 oz.	90 G. 3.2 oz.
Maximum	234 G. 8.3 oz.	188 G. 6.7 oz.	110 G. 3.9 oz.	69 G. 2.4 oz.
Girls				
Minimum	160 G. 5.7 oz.	155 G. 5.5 oz.	110 G. 3.9 oz.	90 G. 3.2 oz.
Mean	192 G. 7 oz.	152 G. 5.4 oz.	111 G. 3.9 oz.	90 G. 3.2 oz.
Maximum	232 G. 8.2 oz.	167 G. 5.9 oz.	102 G. 3.6 oz.	58 G. 2 oz.

*Calculated from low point after initial loss; period 12½ weeks.

It is interesting to note that in the first 6 months the rate of growth is in direct ratio to the birth weight, while in the third 3 months the rate is about the same for all babies, and in the fourth 3 months the rate of gain is in inverse ratio to the birth weight. This may be construed as meaning that heavy infants bring into the world a relatively strong growth impulse which gradually diminishes toward the end of the year, while small infants have at first a weak growth impulse which gradually grows stronger

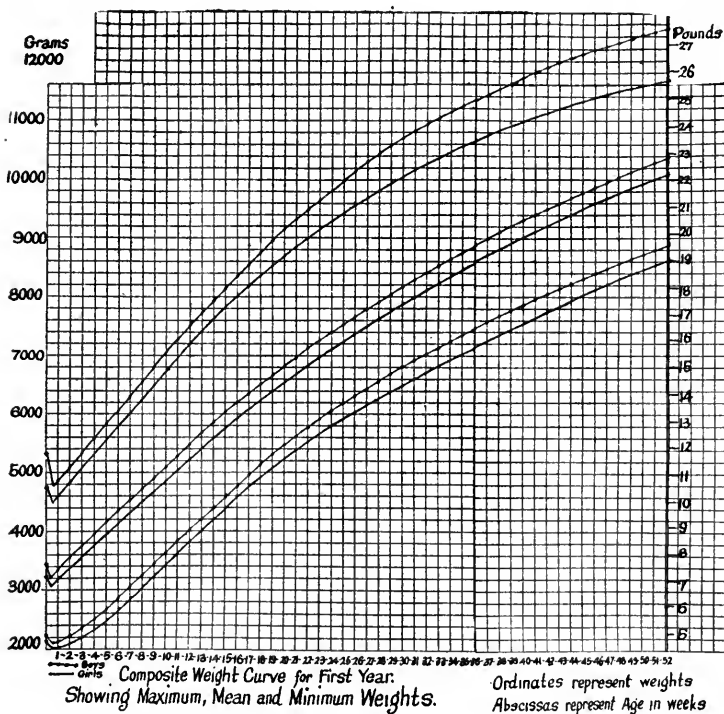


FIGURE 2.

during the year. How long this compensatory process continues after the first year would be a subject worth study.

The subject of seasonal variation in growth in infants has been studied by Camerer, Bleyer¹¹ and others. Seasonal variation in birth weight has received less attention. In our series a considerable variation in the birth weights of boy babies has been encountered, while those of girl babies have been found curiously

TABLE IV
Showing seasonal variations in birth weight

Period	No. cases	Boys	No. cases	Girls
Jan.-Mar.	87	3576.0	75	3353.8
Apr.-June	55	3496.4	47	3358.0
July-Sept.	82	3425.0	60	3383.7
Oct.-Dec.	75	3516.4	99	3352.5
Oct.-Mar.	162	3549.0	174	3353.1
Apr.-Sept.	137	3453.7	107	3373.1

constant throughout the year. These points are shown in Table IV.

Studying seasonal variations in the rate of growth of babies in St. Louis, Bleyer came to the conclusion that there is a distinct acceleration of growth in the summer months. San Francisco climate, with its small seasonal temperature variation and its relatively cool summers, might be expected to show correspondingly slight seasonal variations in growth. The following curves (Figure 3) were constructed from the rates of gain of a group of about 200 babies, breast fed and bottle fed, and from the records of the Weather Bureau, averaged for the period 1912-1916. The fluctuations in growth are irregular and have no very close relationship with season, temperature or humidity. In the breast fed group the maximum rate is attained both in February and in August, while in the bottle fed group it is attained both in March and November.

Brief mention may be made of certain other points which were studied but which gave less definite or incomplete results. An attempt was made to determine the frequency curve, or weight distribution, for each weekly or 4 weekly period, but had to be abandoned when it was found that an enormously greater mass of statistics was required than we possessed. Percentile tables of the Smedley type have been tentatively constructed, but are not sufficiently complete as yet for publication.

COMMENT: A comparison of the San Francisco curve with other similar curves has more than a local interest. We have, it is true, particularly favorable climatic conditions but on this basis alone it hardly seems possible to explain the fact that our clinic babies now run a course of first year growth like that of the babies of the privileged classes elsewhere, ending the year nearly 2 pounds heavier than babies of the corresponding class in New York. It is, indeed, quite likely that a revision of the figures in other cities would show an upward movement of the curve, as has our own. It will, perhaps, be worth while to attempt an analysis of the conditions upon which growth in infancy is dependent.

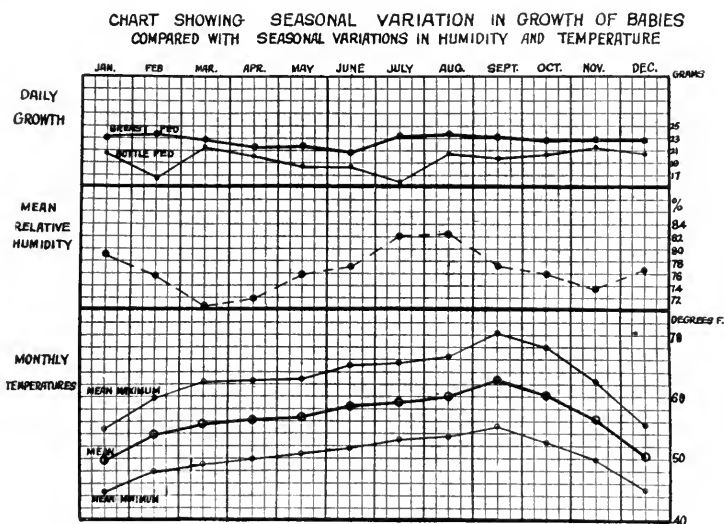


FIGURE 3.

The rate of growth in so-called normal infants is mainly dependent upon (1) heredity; (2) favorable antenatal conditions; (3) birth weight; (4) economic status of the parents; (5) purity of the milk supply; (6) climate; (7) educational level of the community, particularly as regards hygiene. The relative importance of these factors in our own community appears to be about as follows. We have here a mixture of races (at least in our clinics) which is much like that of other large urban centers in America, and there has not been much change in this respect within the last 20 years. Prenatal clinics, such as that of the Stanford Women's Clinic, have undoubtedly brought mothers to confinement in bet-

ter physical condition and better trained in motherhood. They have, however, so far as we have been able to determine, not increased the average weight of babies at birth. The economic status of the group we have studied varies little from year to year, since an improvement in status sends patients to the private physician. This factor then is a constant and does not account for an increasing growth rate, except in so far as the ill effects of poverty are better counteracted by the increasing efficiency of Social Service. The purity of the milk supply has already been discussed and is certainly reflected in the high level of the curve. It has, however, been a constant for 5 or more years and, like the favorable climate, probably has little to do with recent improvements in growth. The cause of these must probably be sought for in the remaining factor, education.

Education of the community in hygiene in general and in the care of babies in particular has been an extremely intensive process during recent years. The annual Baby Week, the propaganda of the Children's Bureau, the establishment of prenatal clinics and of clinics for well babies have all had their effect. Perhaps of the most importance, at least in immediate results, has been the clinic for well babies. Here every mother, by precept from physician and nurse and by example from the mothers and babies she meets in the clinic, is made to know and to feel the real value of breast feeding, of certified milk, of proper regulation of the formula and diet, of regular weighings and so of the maintenance of steady gain in her baby. In spite of all criticisms levelled at the average weight line of the growth chart, we believe that the net results of its use is good, if for no other reason than that it undoubtedly stimulates the mother's interest in her baby's progress so that she comes to the clinic, and so to the doctor, at regular intervals. The dangers of overfeeding in an attempt to keep the baby up to the standard are in our opinion much exaggerated and can be easily obviated. By the use of a chart showing minimum and maximum weights we hope to remove the main objections which can be made against the older form of chart containing but a single line.

It remains to be said that the growth curve has a distinct potential sociological value since it probably is a fairly reliable index not only of the welfare of the infants in a community but of

all the hygienic and economic conditions which influence the well-being of the community in general. If this is true, it would be an excellent thing if a weight curve were made for a representative city in each major section of the country. The comparison of the various local curves could not fail to act as a stimulus to welfare work in those communities which found themselves backward. A revision of the curve from year to year would give a graphic record of the progress made. That such progress may be promptly obtained through systematic and energetic effort can hardly be questioned.

It is a pleasure to pay a tribute to the thorough and efficient work of Dr. H. H. Yerington in organizing and conducting the Baby Clinic.¹² The very pleasing results in improving the welfare of our babies as shown in the present study are due in very large part to his efforts. I wish to acknowledge also the valuable assistance rendered by Dr. Virginia Murray in the earlier compilations.

CONCLUSIONS.

1. There are local variations in first year growth and there should be a weight curve for each major section of the country.

2. A growth (weight) curve has been constructed from the weights of San Francisco babies, showing maximum, average and minimum weights for age and for both sexes. It is hoped that this plan may obviate the disadvantages of the chart with a single average line.

4. The average line of our babies of the clinics approximates that of babies of the favored classes elsewhere. The reasons for this are discussed.

5. The average weight, especially in the second 6 months of the first year, has increased here during the last 2 years and there are indications that the same phenomenon is occurring in the East. Reasons for this are discussed.

6. Monthly variations in the rate of growth are compared with temperature and humidity for the corresponding months.

7. The sociological value of the weight curve as an index of the conditions in a community affecting infant welfare is pointed out.

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NOTE

These three papers, specially contributed for this Pacific Coast Number, have been crowded out because of lack of space:

The Food Requirement of the Breast Fed Infant. By Henry Dietrich, M.D., Los Angeles.

Mental Examinations as an Aid to Pedagogical Methods in the Public Schools. By William C. Hassler, M.D., and Olga Bridgman, M.D., San Francisco.

Speech Disorders and Defects. By Mabel Farrington Gifford, San Francisco.

They will appear in the next issue.

DEPARTMENT OF ABSTRACTS

SEHAM, MAX: THE ACIDOTIC STATE OF NORMAL NEW-BORNS. (American Journal of the Diseases of Children, July, 1919, p. 42.)

Seham made 150 determinations on 50 babies whose ages ranged from 1 hour to 32 weeks and concluded that alveolar carbon dioxide tension is a practical index of acidosis. Fifty c.c. of air in the bag, over a period of 30 seconds, for breathing gives the most constant results. The modification of the Plesch-Higgins' method of collecting air with the use of the pulmotor mask is the most practical way of collecting air from new-borns. He was not able to establish a lower CO_2 tension which is indicative of the so-called "acidotic state." The ingestion of food, or starvation and muscular exercise under these conditions, have no constant demonstrable effect on the alveolar CO_2 tension. The urine of the normal new-born is nearly always acid. It takes on the average 1.7 gm. of sodium bicarbonate to turn the urine from acid to alkaline, giving 0.16 gm. every 2 hours by mouth. His results with the alkali tolerance test for normal new-borns do not indicate an acidosis. Practically no acetone was found in the urine of normal new-borns.

C. A. LANG.

GIVENS, MAURICE H. AND McCLUGAGE, HARRY B.: THE ANTISCORBUTIC PROPERTY OF FRUITS (AN EXPERIMENTAL STUDY OF DRIED ORANGE JUICE). (American Journal of Diseases of Children, July, 1919, p. 30.)

In this experimental study Givens and McClugage used orange juice which was dried by two methods and both products were fed to healthy guinea-pigs. These animals, fed on a mixed diet containing plenty of green vegetables, developed scurvy similar to that seen in humans, so are especially adapted for the experimental study of the antiscorbutic vitamin. They demonstrated that experimental scurvy in the guinea-pig can either be averted or cured, by the use of a small amount of orange juice. Orange juice can be dried so that it retains a significant amount of antiscorbutic vitamin. The most satisfactory process for drying is the one in which the temperature of drying is not unduly high

and the duration of drying very short. If orange juice is submitted to a temperature of from 55 to 60° C. for forty hours or more, a part of the antiscorbutic vitamin is destroyed. The dried orange juice investigated by the authors was active after 3 months' storage. Whether it will retain its potency for an indefinite period remains to be determined. By desiccation of orange juice it is possible to save a large amount of fruit hitherto wasted. Through such conservation of a waste product, it ought to be possible to establish a price on dried orange juice which is within the reach of a great many people who cannot at present afford fresh fruit. They suggest the use of dried orange as a convenient antiscorbutic in infant feeding, on polar expeditions, in the navy, and for soldiers during war.

C. A. LANG.

WARWICK, MARGARET: CEREBRAL HEMORRHAGE OF THE NEW-BORN. (*The American Journal of the Medical Sciences*, July, 1919, p. 95.)

In a report of 36 routine autopsies performed on still-born babies or those dying early in infancy, Warwick found 18, or 50 per cent, showed definite hemorrhages in the dura, over the brain or in the ventricles. She gives a brief review of the literature as to pathological findings and causes of the same and then summarizes as follows:

1. The condition is brought about by trauma in normal or rapid deliveries, by congestion or asphyxiation in slow deliveries, or by disease of the child itself.
2. The so-called "hemorrhagic disease of the new-born" is a much neglected but very important cause of cerebral hemorrhage in infants, occurring in 44 per cent of the deaths of her series.
3. Forceps deliveries, advanced age of the primipara mother and syphilis probably do not play as important a role in the etiology of this condition as was formerly supposed.
4. More careful and complete routine autopsies on new-born infants as well as more accurate observations on the conditions of the mothers and circumstances of the birth are needed as a foundation for further studies.

C. A. LANG.

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ORIGINAL COMMUNICATIONS

THE INFLUENCE OF EPIDEMIC POLIOMYELITIS UPON THE SUSCEPTIBILITY TO AND THE SYMPTOMATOLOGY OF OTHER CON- TAGIOUS DISEASES.*

By JOSEPH C. REGAN, M.D.

Kingston Avenue Hospital, Brooklyn, N. Y.

The epidemic of poliomyelitis, which visited New York City and vicinity in 1916, was notable for its extensive character and high mortality. During the period of epidemicity, from the latter part of June to the first part of October, 1798 cases were admitted to the Kingston Avenue Hospital.

Owing to the large number of new patients who were literally pouring into the hospital daily, it was a most difficult task to exercise the same scrutinizing attention and routine which is

*From the Bureau of Hospitals, Department of Health, New York City, Dr. Robert J. Wilson, Director.

customary in receiving other contagious diseases in order to avoid the appearance of mixed infections in the open wards. Insomuch as the majority of the admissions were children of an age in which contagion is most common, it was considered probable that a small number of poliomyelitis patients would be received who were in the incubation period of a secondary malady, and that subsequent to entrance to the hospital symptoms of the secondary disease would appear, the children in the same ward would then be exposed, and an outbreak of mixed infection on a small scale would supervene.

It may be well to state before proceeding further that small outbreaks of mixed infection constitute a common experience in the treatment of all contagious diseases, especially in hospitals with open wards. Such outbreaks originate from the importation of infection into the hospital from without. Thus a patient suffering from a particular disease may be admitted to that service while in the incubation period of a secondary malady. Usually in these instances the admission has occurred before diagnostic symptoms (rash, etc.) of the secondary disease have made their appearance; or on the other hand it may be a question of mistaken diagnosis. Thus the sore throat and streptococcus exudate of an early case of scarlet fever may be mistaken for diphtheria, the rash not having as yet appeared, or the onset of measles, with catarrhal croup, may be mistaken for laryngeal diphtheria, Koplik's spots being indefinite or overlooked. At other times the outbreak originates from the failure of the family to tell the ambulance surgeon that the patient was exposed sometime previously to another infection.

The result in any case is that the child, after admission to an open ward, develops the secondary infection and as a result all the children in that ward are exposed. It will therefore be readily appreciated with what caution the examination of patients must be carried out on entrance to the hospital to guard against such occurrences. Yet even so, mixed infection at times originates. Scarlet fever, measles, varicella, etc., break out in the diphtheria ward; diphtheria, scarlatina, varicella, etc., in the measles ward, and so on. The diseases which are most apt to appear thus are measles, varicella, diphtheria, scarlet fever and pertussis. Of these, measles and varicella are the most contagious and more generally lead to the largest number of secondary cases.

Once exposed, a ward must of necessity be quarantined from the remaining part of the service in order to prevent the dissemination of the secondary infection. The executive care of the service is thus increased, the segregation of patients is complicated, the beds available for new admissions are diminished, the mortality rate is occasionally augmented and the exposed ward may have to be vacated in order to thoroughly clean and fumigate it.

Therefore, reasoning from past experiences, outbreaks of mixed infection, in the poliomyelitis wards were anticipated and dreaded. Special care was taken to examine all children on entrance for signs of other contagious diseases, attention being particularly directed towards the buccal mucosa for evidence of Koplik's spots, the throat for signs of exudate and the skin for rashes.

A source of confusion at once arose. A small number of the poliomyelitis patients presented minute macular spots on the buccal mucosa resembling early Koplik's spots. These cases were isolated for further observation. In no instance, however, did symptoms of measles develop. Then again, a number of the children were admitted with a rash. As the eruption was in the majority of cases scarlatiniform and as the tongue is often heavily coated and the throat congested in both scarlet fever and poliomyelitis, a differential diagnosis was sometimes not easy. The presence of paralysis would, of course, indicate poliomyelitis, but the possibility of a mixed infection of both diseases could not be excluded, even after resorting to a lumbar puncture. The latter findings, if positive, would often point towards poliomyelitis, but would not prove anything regarding scarlet fever. Hence such cases also required isolation.

As the epidemic progressed and none of the children isolated developed further symptoms or complications of the suspected disease, these rashes were regarded with less suspicion, and the writer was eventually compelled to conclude that patients with poliomyelitis may have an eruption as part of the symptomatology of the disease.*

One week after another of the epidemic passed without any serious outbreak of mixed infection, and the poliomyelitis service

*The skin and throat manifestations of epidemic poliomyelitis have been described by the writer in a previous article, *ARCHIVES OF PEDIATRICS*, December, 1917.

remained virtually free throughout the epidemic of other contagious diseases, with the exception of whooping cough.

Table I gives the total number of cases of mixed infection developing in the hospital among the 1798 patients admitted:

TABLE I.

Poliomyelitis developing	pertussis.....	9 cases
“	“ measles	1 “
“	“ diphtheria	3 “
“	“ scarlet fever	1 “
“	“ varicella	1 “
Total		15 “

The percentage of mixed infection developing in the hospital on this service was therefore 0.83 per cent.; if pertussis be excluded from the series, it was 0.33 per cent., an extremely low incidence, compared to that usual in other contagious diseases.

An analysis of the cases mentioned above is interesting. As the table shows, 1 patient developed measles. The child was admitted in the incubation period and developed symptoms 10 days following entrance to the hospital. The rash had made its appearance before the malady was recognized. No secondary cases came down with the disease, despite the fact that the outbreak occurred in an open ward with 32 other children, of susceptible age, and not more than 20 per cent. of them were protected by an antecedent attack. In the light of previous experiences with outbreaks of measles in other contagious wards, this total absence of secondary cases was unusual. From such an exposure sometimes, especially in diphtheria, 0.50 per cent. of those not immunized by a previous attack will contract the disease.

Regarding the one instance of mixed infection with scarlet fever a somewhat similar experience occurred. Not a single secondary case developed, although the ward was filled with 30 young children and only a few had a history of an antecedent attack.

The 3 cases of diphtheria originated in different wards. In none of these 3 wards thus exposed did secondary cases follow. This was rather surprising, for Zingher has shown that the Schick reaction was positive in 81 per cent. of 954 children with poliomyelitis between the ages of 1 and 4 years, compared to 30 or 40 per cent. positives in normal children.

No secondary cases of varicella followed the exposure to the one patient who developed that disease.

The only disease which was in the least prevalent among the patients was pertussis. In several different wards patients developed symptoms of the disease. Several secondary cases appeared in each ward, making a total of 9 in all.

Not only was the occurrence of mixed infections of poliomyelitis with other diseases notably slight in the hospital but the number of patients admitted with double infections of any of the acute contagious diseases plus poliomyelitis was also at a minimum. Thus Table II shows the total number and type of these admissions:

TABLE II.			
Poliomyelitis and pertussis 14 cases			
"	"	measles	2 "
"	"	mumps	1 "
<hr/>			
Total 17 "			

If Table I and II be added, it will be seen that out of the 1798 patients admitted only 32 had on entrance to the hospital or developed later another contagious disease giving a percentage of incidence of mixed infection in poliomyelitis among cases treated during the 1916 epidemic of 1.72 per cent. If pertussis be excluded from the series, the percentage of incidence is reduced to almost one quarter of the total, namely, to 0.50 per cent.

This we believe is to be considered a very low figure for several reasons. In the first place, most of the patients were children of an age in which contagious diseases are most common and many of them had little or no history of previous attacks. Then again the epidemic was so extensive that the incidence of poliomyelitis in the City per 1000 of population between the ages of 1 and 5 years was 28.26 cases.¹ Moreover, of the total of 4265 cases that occurred in Brooklyn, the Kingston Avenue Hospital no doubt received a high percentage of all those with mixed infection, as such cases would occur mostly in the poorer sections of the city where hospitalization was more or less routine. Consequently they would be sent to a hospital for treatment, and the only hospital in the borough receiving contagion in addition to poliomyelitis was the Kingston Avenue. Hence we feel certain that the percentage given above, 1.83 per cent. or 0.55 per cent, excluding

pertussis, would be greatly reduced if the total incidence of mixed infection and poliomyelitis could be ascertained throughout Brooklyn.

It might be possible to attempt to explain, on the basis of lack of exposure, this low incidence of mixed infection if during the first part of the epidemic contagious diseases in New York City were at a very low minimum. That this was not the case, examination of Table III will show. At the time when the epidemic began, namely the latter part of June, and subsequently for several weeks, the prevalence of contagion was almost as high as during the winter months of December 1915, January and February 1916. Moreover, the districts in Brooklyn in which the

TABLE III—CASES OF INFECTIOUS DISEASES REPORTED IN NEW YORK CITY FROM DECEMBER 1915 TO AUGUST 1916.*

	Dec., 1915	Jan., 1916	Feb., 1916	Mch., 1916	Apr., 1916	May, 1916	June, 1916	July, 1916	Aug. 1916
Measles	895	1,242	1,894	3,281	4,208	4,579	3,393	1,813	417
Scarlet Fever.....	520	680	753	948	842	791	489	300	78
Whooping Cough....	463	465	526	930	1,094	1,140	1,033	968	755
Diphtheria	1,390	1,572	1,485	1,570	1,329	1,715	1,570	1,064	511
Mumps	173	228	351	617	730	766	746	240	114
German Measles.....	50	86	113	225	346	475	395	132	29
Chicken Pox.....	661	956	874	1,439	1,623	1,747	1,331	430	70
Totals	4,152	5,229	5,996	9,010	10,172	11,213	8,957	4,947	1,974

*From the Monthly Bulletin of New York Health Department.

epidemic was the most severe were the more crowded quarters and those where the people lived under very unhygienic surroundings and in which one usually also finds contagion most prevalent. In this connection, one must consider the widespread dissemination of poliomyelitis (for every 1000 persons between the ages of 1 and 5 years there were 28.26 cases). Therefore it would seem probable that the factor of lack of exposure can be ruled out.

The various facts mentioned above, regarding the infrequency of the simultaneous occurrence of poliomyelitis and other contagious diseases, are certainly of such an unusual character as to permit a few logical deductions. Naturally it is not possible to

draw any hard and fast rules in a study of this kind and the conclusions which are eventually made will depend for their corroboration upon future observations.

Either one or both of 2 suppositions are strongly suggested:—

(1) That children with acute poliomyelitis are not prone to develop other contagious diseases with the exception of whooping cough or (2) that children suffering from contagious diseases are not usually prone to develop poliomyelitis.

That children with poliomyelitis are less susceptible to other contagious diseases, with the possible exception of pertussis, would be indicated by the following: (1) The small number of combined infections of poliomyelitis and other contagious disease admitted to the hospital during the epidemic; (2) the small number of patients who developed a mixed infection after admission to the wards and the complete lack of secondary cases following such outbreaks (excluding pertussis); (3) these preceding facts to be considered in conjunction with the relatively large number of cases of contagion existing throughout the city at the time of the epidemic and the widespread character of this latter.

That patients with other contagious diseases are less apt to develop poliomyelitis than normal children seems also a very probable supposition, as is indicated by the small number of patients with mixed infection admitted to the hospital, as well as to a lesser extent by the fact that the only contagious service in which cases of poliomyelitis developed was the diphtheria. Here a few patients, 3 or 4, contracted the disease. This was the only example of an outbreak of poliomyelitis that occurred on any of the services during the epidemic, despite the fact that the hospital census of contagion on June 30, 1916, was 212 patients.

A THEORY TO EXPLAIN THE ALMOST COMPLETE FREEDOM OF POLIOMYELITIS FROM MIXED INFECTION. The literature dealing with the influence of an attack of a disease prevailing in epidemic form upon the susceptibility of the individual attacked to other acute infections seems to be very meagre. No reference was found relative to the influence of poliomyelitis in this respect. Colin² states that it was the belief of some of the older students of epidemiology, especially the "illustrious" Boudin³, that there existed often a condition of antagonism between various diseases which would explain the attenuation or suppression during an epidemic of other infections. Colin does not think, however, that

this antagonism is so frequent as many observers have contended. Thus he questions the opinion of the older writers that an antagonism exists between such maladies as variola and typhoid, typhus and grippe, variola and bubonic plague, intermittent fever and typhoid fever, etc. It is his belief that antagonism between epidemics is much less considerable than their affinity, as is indicated by numerous places deprived of hygiene in which popular disease of the most diverse type prevails.*

That the virus of poliomyelitis probably temporarily protects the individual attacked from contracting other contagious diseases (i.e. except pertussis), the writer believes. That this is an immunity of a temporary type would therefore be indicated, but as it cannot be due to the presence in the blood of immune bodies, either passively or actively obtained, it must be due to some other condition. To understand the probable basic reasons, we must briefly refer to some fundamental facts of bacteriology. We shall take the privilege of extracting some of these principles from a book of standard authority (Park and Williams⁵):—"When one species of organism is grown on a food medium, the medium usually becomes less suitable for the growth of its kind and of other organisms. When different species are grown together, the antagonistic action of one upon the other may be shown from the beginning. Some species have a coöperative or symbiotic action with other species . . . Microorganisms are also at times directly influenced by the products of the associated organisms. These may affect them injuriously or again the association of one variety with another may increase its virulence i.e. streptococci in diphtheria. . . . On the other hand the absorption of the products of certain bacteria immunizes the body against the invasion of other bacteria as shown by Pasteur, in that attenuated chicken cholera cultures produce slight immunity against anthrax. . . . The enzymes formed by certain bacteria have been found to exert a slight bactericidal action not only on the germs which have directly or indirectly produced them in the body but also on other varieties."

From these fundamental principles of bacteriology, one may attempt to formulate a working theory as follows: That upon

*Welch and Schamberg⁴ believe that the presence of an acute disease is apt to temporarily diminish the susceptibility of the patient to develop most of the exanthematous maladies. Also that the susceptibility to measles may even be temporarily abolished during the existence of another acute infection.

infection with the virus of poliomyelitis, certain changes occur in the tissues of the infected individual, which as a rule render them unsuitable for the growth of other causative agents of most of the acute contagious diseases. In other words, a condition of antagonism exists. It may be that the microorganism of poliomyelitis is so thoroughly distributed and so numerous in the nose, throat and upper respiratory or gastrointestinal tract, that other organisms are quickly overgrown and the other infective agents of the acute contagious diseases find it difficult to obtain an atrium in which they can develop to a sufficient extent to invade the body. Moreover, the products of growth (enzymes) of this particular microorganism may render the tissues already infected unsuitable soil for these other organisms to develop upon. The only germ which clinically seemed to have a symbiotic relation with that of poliomyelitis is the bacillus of whooping cough.

INFLUENCE OF POLIOMYELITIS UPON THE SYMPTOMATOLOGY OF OTHER DISEASES OCCURRING COINCIDENTAL WITH IT, AND VICE VERSA. That the symptomatology and prognosis of a disease may be influenced to a greater or less extent by another concomitant infection is well established by numerous observations. Owing to the complete lack of literature on the subject relative to poliomyelitis, it seemed that it might be of value to give in detail the symptoms and clinical picture of the various mixed infections that occurred on the poliomyelitis service so that conclusions might be drawn as to the effect that this latter disease exerts on the clinical course of other concurrent maladies.

Poliomyelitis and pertussis. There were 23 patients with these 2 diseases treated and all recovered.

Symptoms of poliomyelitis—The type of the disease was myelitic in 7, myelitic and encephalitic in 12, meningitic in 1, ataxic in 2. Bulbar symptoms were present in 3 of the encephalitic cases and meningitic symptoms in 8. Paralysis involved both lower limbs in 13, back muscles in 13, both upper extremities in 2, right upper extremity in 2, facial nerve in 7, muscles of deglutition in 3.

Symptoms of pertussis—Most of the cases were of a mild character. Whooping was present in 19, and vomiting in 17. Four children, under 1 year of age, merely had a paroxysmal cough with terminal expectoration of mucus. An interesting observation was that in several patients with paralysis involving the

muscles of the larynx, the character of the paroxysm was greatly altered. The paroxysmal cough was not nearly so loud as it is usually, and the loud crowing sound of the whoop was often so indistinct that unless one was within a few feet of the patient it would be missed entirely.

Poliomyelitis and diphtheria—The total number of patients developing diphtheria was 3. All recovered. The disease was myelitic in type in all 3 instances. The paralysis involved both lower extremities in 2 cases and the right lower and left deltoid in 1. Two of the patients had nasal diphtheria and one tonsillar. They were all mild types of the disease requiring 5000 units of antitoxin for 2 cases and 10,000 units for 1. Cultures were positive in all 3 cases. Symptomatology was uninfluenced.

Poliomyelitis and scarlet fever—Only 1 case was treated. This was a boy, age 5 years. Patient presented typical symptoms, mild angina with follicular exudate on tonsils, strawberry tongue, and punctate erythematous rash. The type of poliomyelitis was myelitic with involvement of lower extremities, neck and back. The disease pursued a mild course and patient recovered.

Poliomyelitis and measles—The total number of cases treated was 3; of these 2 recovered and 1 died. Two cases were admitted as poliomyelitis and measles and 1 case developed measles 10 days after admission.

Case 1. Age 21 months, ill 21 days with poliomyelitis and 3 days with measles, when admitted. Rash was maculopapular, and generalized. Koplik's spots were present, also slight coryza. Myelitic type of poliomyelitis with paralysis of both lower extremities. Child recovered.

Case 2. Age 2 years, ill 13 days with poliomyelitis and 3 days with measles on admission. Rash was maculopapular, coryza present. Koplik's spots fading. Myelitic and meningitic type of poliomyelitis. Paralysis of both lower extremities, back and intercostals, also rigidity of neck and positive Kernig. Child died the third day after entrance of respiratory paralysis.

Case 3. Age 3 years, admitted as a case of poliomyelitis with paralysis of both lower limbs, left facial nerve and intercostal muscles. On 10th day developed Koplik's spots and coryza, and 2 days later a generalized maculopapular rash. Recovery occurred. The symptomatology was typical in all 3 instances.

Poliomyelitis and varicella—One case, age 3 years. De-

veloped varicella 34 days after admission. No known exposure within the hospital. Had paralysis of both upper extremities, left lower, also of left facial nerve. Recovery ensued. Symptomatology typical.

Poliomyelitis and mumps—One case admitted with both diseases. Patient was 2 years old. Had involvement of both parotids. Myelitic type of poliomyelitis. Course was uneventful and patient recovered. Symptomatology fairly typical.

SUMMARY. 1. The occurrence of mixed infection constitutes a possible source of danger in the hospital treatment of all contagious diseases.

2. This danger was considered to be particularly acute in the hospitalization of patients with poliomyelitis during the 1916 epidemic. Large numbers of children with this disease were admitted daily to the Kingston Avenue Hospital, most of them of an age which is most susceptible to the various contagious maladies and many of them with an almost entirely negative history as to previous attacks. During the early period of the epidemic, when patients were pouring into the hospital most rapidly, contagious diseases in New York City were as prevalent as during the preceding winter months of December and January. It was therefore considered probable that exposure to other contagious diseases would occur in many instances.

3. Certain symptoms, such as rashes of scarlatiniform type, heavily coated tongue, congested throat and occasional minute spots on the buccal mucosa, which occur as part of the symptomatology of poliomyelitis, caused at first confusion and a number of patients were isolated as possible cases of measles and scarlet fever. The subsequent clinical course of the disease proved that the suspicious symptoms were to be attributed entirely to poliomyelitis.

4. As the epidemic progressed, the notably small incidence of mixed infection developing after entrance to the hospital was noted. Considering the facts of the case, the figures we believe are unusually small. Thus the total number of patients developing a mixed infection, subsequent to admission, was only 15, or, compared to the total number received, 0.83 per cent. and, if 9 cases of pertussis be excluded, 0.33 per cent. ($\frac{1}{3}$ of 1 per cent.).

5. These 15 cases were divided among the various diseases as follows:—9 pertussis, 3 diphtheria, 1 measles, 1 scarlet fever and

1 varicella. No secondary cases followed the outbreaks of the cases of diphtheria, measles, scarlet fever or varicella, despite the fact that the wards in which these diseases broke out were filled with children, the majority of them unprotected by previous attacks.

6. Not only was mixed infection of poliomyelitis with other contagious diseases notably slight in the hospital but the number of patients admitted with double infections of this and some other contagious malady was also noticeably small—17 in all or compared to the total admissions, 0.94 per cent.

7. Thus out of a total of 1798 patients with poliomyelitis treated there were only 32 cases who had, on admission or developed subsequently, another disease, giving a percentage of incidence of 1.72 per cent. Of this total of 32, there were 22 with pertussis; if these be deducted the incidence is reduced to 0.59 per cent. This figure is undoubtedly much higher than the actual ratio of mixed infection in poliomyelitis in the City as a whole, for while there were 4312 cases of the disease in Brooklyn only 1798 were received at Kingston Avenue. On the other hand, being a contagious hospital, we no doubt received a high proportion of all cases of mixed infection.

CONCLUSIONS.

1. The above facts indicate that children with poliomyelitis are not as susceptible to develop other contagious diseases as normal children with the possible exception of whooping cough. This latter was the only contagious malady prevalent among the poliomyelitis patients during the epidemic.

2. A working theory to explain this temporary relative insusceptibility may, we believe, be based upon certain fundamental principles of bacteriology:—Upon infection with the virus of poliomyelitis, certain changes occur in the tissues of the infected individuals, due possibly to the products of growth of the organism of poliomyelitis, which render them unsuitable for the development of the causative agents of other acute contagious diseases. In other words, a condition of antagonism exists. It may be that the causative factor of Heine-Medin's disease is so thoroughly distributed and so numerous in the nose, throat and upper respiratory tract that the infective agents of other acute contagious dis-

eases find it difficult to obtain an atrium in which they can develop to a sufficient extent to invade the body. The only germ which seems clinically to have a symbiotic relation with that of poliomyelitis is the bacillus of whooping cough.

3. The influence of poliomyelitis on the symptomatology of scarlet fever, diphtheria, varicella, measles and parotitis seems to be negligible with the one exception that symptoms of the associated diseases were milder than usual. The only malady in which symptoms were observed to be definitely modified was pertussis. Thus in cases of poliomyelitis, with paralysis involving the muscles of the larynx, the paroxysmal cough was often rendered much less audible and the whoop so soft as only to be heard if one was quite close to the patient.

4. The mortality rate of these mixed infections was remarkably low, namely, 3 per cent. compared to 23.79 per cent. in the straight poliomyelitis cases.

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ESSENTIAL ENURESIS IN CHILDREN (Pediatria, Naples, Sept., 1919). U. Provinciali reviews the various theories that have been advanced to explain essential enuresis, and states that in eight out of ten children of this category roëntgen examination revealed anomalies in the lumbar-sacral portion of the spine. In only two were these parts of normal aspect. The children with these anomalies did not show any other appreciable signs of degeneracy or only in a proportion much less than in adults. As the children usually outgrow the enuresis in time, he urges roëntgen examination of their spines to see if it might not be possible to detect the nature of the anatomic changes which put an end to the enuresis. He protests against the assumption of dysplasia in the spinal cord or roots, as this would entail quite another set of symptoms, more in the line of neuralgia or paralysis.—*Journal A. M. A.*

FROZEN MILK*

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During the past 3 years, and particularly during the severe winter of 1917-1918, I have been asked repeatedly by patients about frozen milk, and as to whether its use was harmful in infant feeding. It frequently had happened that, owing to delayed deliveries, and to the extreme cold, milk would be received in a more or less solid state necessitating its thawing out by means of heat. In some cases, milk delivery was prevented for 2 or 3 days by snow drifts, and the milk would accordingly be from 4 to 5 days old when used, plus having been frozen. Naturally the mother would hesitate to use this milk as there was a preconceived prejudice against its use. At the time, and indeed ever since, I advised against it, although I had only precedent to go by. In this paper, therefore, I have endeavored to collect all the facts of the case and to form conclusions as to whether or not its use is injurious to infants or young children. This has not been easy, for in reviewing the literature one is surprised at the scarcity of material written on the subject. There is also a confusing difference of opinion about various points which still remains to be cleared up.

The first record of the use of frozen milk in commerce that I have been able to find in the literature is contained in an article by Duclaux¹, written in 1896. Later (1907), milk frozen at -5° C. and reduced to a powder was shipped from Sainte Laurent en Champsaur (Hautes-Alpes) to Marseilles². Duclaux believes that the reason frozen milk has not been transported from a region where it abounds to one where it is rare, is due to custom alone, and not on account of any valid objection to the method. He admits though, that milk delivered in cold countries in a frozen condition has a changed taste, without the ordinary flavor, and that there is less cream. He believes, however, that with the aid of refrigerating machines these difficulties are not insurmountable. The firm of Gillay of Lille, for example, over 24 years ago shipped from Lille to Paris, boxes lined with tin plate on the inside with tightly fitting covers, containing loaves of

*Read at the New York Academy of Medicine, Section on Pediatrics, April 8, 1920.

frozen milk in the form of flat tablets. These are prepared as follows: The milk is first pasteurized, then plunged into a refrigerating bath of 25° F. in a flat metal case. This causes almost instantaneous freezing. The crystalline needles implant themselves perpendicularly on the walls of the box, and extend down to the middle of the mass, so that when the shape is drawn from the mould, there is a hard cake, more crumbly in its median plane, or where the 2 layers of crystals come together to form joists. These cakes are placed side by side upright in the box, with an intervening space so that they do not stick together.

Soon after their preparation these masses of ice undergo a singular change in appearance. From an original yellow tinge they whiten and become more transparent. It was Duclaux's experience that the upper part of the cake was the first to change. Accordingly he detached from the top and bottom of the cake 2 bands which were allowed to melt separately with the following results:

	UPPER PART		LOWER PART	
	Elements in Suspension.	In Solution.	In Suspension.	In Solution.
Fats	2.73	....	2.72	....
Milk sugar.....	....	4.19	....	4.88
Casein	2.56	0.21	3.91	0.34
Phosphate of lime....	0.17	0.12	0.24	0.16
Soluble salts.....	....	0.28	....	0.36
	<hr/> 5.46	<hr/> 4.80	<hr/> 6.87	<hr/> 5.74
Total residue.....	10.26		12.61	

I may say incidentally that these analyses agree with that of other observers.

A comparison of the 2 analyses shows that the liquid coming from the melting of the lower part is richer than the upper. Their composition is normal, but one is more diluted and the other more concentrated than the original whole milk. This is quite obviously due to the concentrated liquid of the upper stratum by force of gravity, gradually losing part of its contents which have been entangled in the water crystals, very similar to a sponge. The one thing to be noted is the fact that the fats have not

followed in the descent of the concentrated milk (2.73 per cent. as compared with 2.72 per cent.). This is due to the fact that the fat is solidified at the low temperature to which it has been subjected, and is firmly adherent to the ice crystals which they only leave when these crystals melt. This is the reason advanced by Duclaux for the changes in taste which one sometimes gets in frozen milk, where it has only been either partially frozen or partially melted. If the frozen milk is allowed to thoroughly melt, and if it is mixed to insure its homogeneity, he found no particular taste or change in taste.

C. Mai³ had rather similar results to those obtained by Duclaux. He had samples of normal milk frozen, each at a different temperature, and for a different length of time, and then all thawed out under the same conditions. Analyses of the mushy top ice, the solid cakes on the sides and bottom, the unfrozen portion in the middle, and of the whole milk after being again thawed and thoroughly mixed, indicate: 1. Even when the outside temperature is 18° F., a large part of the cream will rise before the milk freezes; 2. The calcium chloride, serum, acidity and solids (not fat) of the residual unfrozen portion are much higher, and of the solid ice lower than the same factors in the original milk; 3. That there is no permanent change in the composition of the milk due to freezing and thawing. He feels that there is no reason why samples of milk should not be collected in the winter if the frozen mixture can be thoroughly melted and mixed before the samples are used.

A fact which has been utilized in milk preservation in cold storage warehouses, is that the growth of organisms in milk is delayed by cold, and that there is, accordingly, a retardation of those processes which eventually would make the milk unfit for consumption. In the past it has been popularly supposed that all bacterial life is dormant during this period of extreme cold. This is probably due to the fact that with milk, which has been packed in ice, the rate has been extremely slow. In fact, during the first 24 to 48 hours there is a definite loss of organisms. Conn and Esten⁴ report 3 experiments where milk was kept at 1° C. They found that scarcely any bacterial development took place for from 6 to 8 days, after which time there was a steady increase until very great numbers were present, though the usual lactic acid organisms were not in the majority, therefore the milk did

not curd. They also found a comparatively large number of gelatin-liquefying organisms, and a number of the "neutral" milk organisms; that is bacteria which produce neither acid or alkali. In their summary, they state that milk is not necessarily wholesome because it is sweet, especially if it has been kept at low temperatures. It may contain enormous numbers of bacteria, among which are species more likely to be unwholesome than those that develop at 20° C.

Pennington⁶ has made an extensive study of the bacterial changes which occur in milk at low temperatures. The experiments were conducted upon certified milk and ordinary market milk, the 2 being run side by side and the results compared. It was found that the bacteria increased markedly in numbers *after the first 48 hours*. The milk used in some instances was kept almost 2 years at 29° to 31° F. in packages. Incidentally the freezing point of milk is 30.9° to 31.02° F. Bacteria growth at the end of a week, even in the cleanest milk, which contained 300 bacteria to the cubic centimeter, was pronounced. Within 6 weeks it often passed the billion mark per cubic centimeter.

Within 3 weeks milk kept at this temperature froze in the form of small ice crystals in the vessels containing them. In spite of the freezing an enormous increase in the bacteria occurred, and it was found that there was neither odor or taste to indicate that this had happened. Another interesting point was that the milk did not curd, even on heating, and it was not until the putrefactive organisms had multiplied was its use to the casual observer contraindicated.

Pennington's technique was as follows: The number of organisms in the milk was found by plating in suitable dilution and counting the colonies in the usual way. In order to have some idea of the qualitative as well as the quantitative relation of these organisms, plates were made on several different kinds of media. A plain nutrient agar was used for the total count. A lactose agar, containing sufficient litmus to color it a clear blue was used to pick out, more especially, the acid forming organisms; and a lactose-litmus gelatin served for the detection of those organisms which form proteolytic enzymes.

A classification on a chemical basis of the organisms occurring at these low temperatures showed that there were constantly present bacteria which formed acid, and bacteria which acted

on proteid. There were also neutral organisms which formed neither acid or alkali and did not act on gelatin. The acid forming organisms were generally in relatively *smaller* numbers than are found when milk is kept at higher temperatures, and the liquefying organisms were more numerous. Certain species, such as *B. formosus*, *R. solitarius*, and *B. Ravenel* were especially resistant to cold. The predominating acid forming organisms found were the *micrococcus aurantiacus* and the *micrococcus ovalis*.

Coincident with the bacteriological study of milk samples there was made a chemical analysis of the changes occurring in the proteid. This showed that the casein was rapidly digested until finally more than 50 per cent. of it was changed to soluble compounds. Caseoses, amino-acids, and probably peptones increase rapidly at the expense of the digested casein. This was pronounced at the end of 2 weeks.

More recently Pennington and her collaborators⁶, having determined that raw milk held at, or a little below a temperature of 0° C., undergoes a marked proteolysis in 2 weeks or less, have endeavored to ascertain whether this is due to the enzymes of the milk, or to the bacterial flora, or to both combined. They have come to the conclusion that the proteolysis of the casein is primarily of bacterial origin, and that the proteolysis of the lactalbumin is due, primarily, to the native enzymes of the milk. They have also determined that the milk enzymes and the bacterial flora combined, give rise to more rapid proteolytic changes than are produced by either agent alone. This involves a breaking down of the true proteins and their passage through peptones and caseoses to the amino-acids.

The determination of the acidity by the decinormal sodium hydrate-phenolphthalein test showed that there was a much higher acid content after 2 weeks than is ordinarily required for curdling—which seldom happened. Milk having this high acidity, even when placed in an ordinary ice chest did not curd even when exposed to the higher temperature.

In regard to the effect of extreme cold on the carbohydrate constituents of milk very little is known. That there is *some* change is indicated by the quite marked increase in acidity which has been determined by the decinormal sodium hydrate-phenolphthalein test. Hepburn⁷ has also shown experimentally that the lactose content decreases after milk has been frozen.

Pennington has determined that the fermentation of the lactose with the resulting formation of lactic acid is largely, if not exclusively, due to bacterial action.

Pennington conducted a series of experiments on the fat content of frozen milk. She found that the iodine number* and the index of refraction of the butter fat remained unchanged, while the Reichert-Meissl† value showed no marked change. The hydrolysis of the fat and the increase in acid value was found to be due to the action of bacteria. This agrees with the findings in the digestion of the protein, the fermentation of lactose and the increase in acidity. All these progressive changes are caused by the vast increase in the bacteria, and are accompanied by progressive lowerings of the freezing point of the milk.

In regard to the action of frozen milk on the digestion of an infant or a young child, there is a wide divergence of opinion, although the weight of evidence seems to be that there is no reason for the belief that frozen milk elaborates toxic substances which will disagree with the average bottle-fed baby. Experimentally we have seen that there is no increase in the number of bacteria in the first 48 hours, and it is seldom, if ever, that milk has been frozen even as long as that time. The action of freezing on the lactose and the fat is seen to be very slight, the protein is split into peptones, caseoses and eventually amino-acids, and that only after a period of 2 weeks or more. I have frequently had babies who were taking frozen milk with no bad results. Kerley⁸ speaks in his text book of having fed many thousand quarts of frozen milk to infants under his care during the past 30 years. Duclaux reports on the practicability of utilizing it commercially, and Mai, that there is no permanent change in the composition of milk due to freezing and thawing. The crux of the whole matter seems to be in insuring its homogeneity by properly melting and mixing it before it is used. Heineman⁹, however, says that under no conditions is thawed milk exactly the same, in every respect, as unfrozen milk. This, he states, is due to the fact that the water

*The iodine number—This is the percentage of iodine or equivalent halogen with which an oil is capable of combining. The modern modification of this method was perfected by Hubl, who used a mixture of solution of iodine with a solution of mercuric chloride, the amount of the absorption being calculated in terms of iodine.

†Reichert-Meissl value—This is the measure in cubic centimeters of decinormal alkali solution of the proportion of volatile fatty acids distilled in a current of steam under constant conditions from 5 grams of the fat saponified and acidified under specific conditions.

freezes at first at the outside on the wall of the vessel; the solids are forced towards the center, the fat rises and is partially churned when the milk freezes. The natural emulsion of fat is never completely restored after thawing, and the casein appears in flakes rather than in the original colloidal condition. The emulsion of fat is destroyed more rapidly than the colloidal condition of the casein. It is probably on account of this that thawed frozen milk *may* decompose more rapidly than normal milk. It is therefore essential that it should be used immediately, if at all. Heineman, however, does not state that this interference with the emulsification of the fat prevents the ready digestion of the milk.

Rosenau¹⁹ also states: "Milk cannot be preserved indefinitely simply by the use of cold. Even at the freezing temperature some of the bacteria continue to grow and multiply, and putrefaction slowly takes place. Milk kept very cold does not sour, but turns putrid because the lactic acid bacteria do not grow at low temperatures, whereas the putrefying bacteria do. While milk should be kept cold, it should not be permitted to freeze, *for freezing alters its composition and may render it undesirable*, especially for infant feeding. . . . Freezing does not destroy the pathogenic bacteria. If milk contains the germs of typhoid, diphtheria, scarlet fever or tuberculosis, the danger is not eliminated even if the milk be frozen. Cold therefore, while a preservative, is not a germicide."

Owing to the marked difference of opinion, I have made it a rule in the past to advise the use of either dry milk or unsweetened condensed milk in cases where the milk has been frozen,—especially among young infants. I have heard indirectly, but not in detail of cases of severe diarrhea following the use of frozen milk, and it is on account of this that I have recommended the above milk preparations as alternatives. It is perfectly possible that a putrefactive diarrhea may ensue, owing to the growth of the putrefying bacteria at low temperatures, and the breaking down of the proteids into amino-acids, or a diarrhea due to lactic and fatty acid formation. I may go on record, however, as stating that personally I have never seen any bad effects from the ingestion of frozen milk, and would gladly welcome additional data on the subject.

CONCLUSIONS

1. There is no increase in the number of bacteria in 48 hours.

2. After 48 hours the increase is marked, although the usual lactic-acid forming organisms are not present in sufficient quantities to form a curd.

3. There is a rapid proteolysis which is pronounced at the end of 2 weeks.

4. The acidity is markedly increased, owing to bacterial action on lactose, changing it to lactic acid.

5. No marked change in the fat has been noted except that caused by bacteria.

6. It is believed by many that frozen milk, if melted and thoroughly mixed, may presumably be used with impunity, within 48 hours after freezing.

7. Owing to divergence of opinion it is better for the pediatricist to substitute a temporary formula of either dry milk or unsweetened condensed milk for milk which has been frozen, especially in feeding very young infants.

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COD-LIVER OIL FOR RICKETY CHILDREN (Medical Officer, 1918, i, p. 47).—G. A. Brown states that the administration of cod-liver oil is an essential and powerful factor in the treatment of these cases. From his observation of the improvement in the general nutrition of rickety children after a course of cod-liver oil, judiciously administered over a long period, he is convinced that the oil is one of our most powerful allies in combating the effects of this wide-spread disease. At the same time excellent food and the good hygienic condition of special schools play an important rôle in the treatment of the disease.—*British Journal of Diseases of Children*.

THE FOOD REQUIREMENT OF THE BREAST FED INFANT

By HENRY DIETRICH, M.D.

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When we consider that the infant in all parts of the world is, and has been, fed at the breast since the creation of the world, we must be struck by the scarcity of observations in regard to the amount of food taken by a child during the period of lactation. Most of the reports cover a period of a few days or weeks, only a very few recording the amount taken from birth until the child was weaned. A very large part of the data comes to us from the foreign literature. In no instance was a daily examination of the breast milk carried out. This would be of scientific interest but less important practically, and we wish to discuss the subject from a practical standpoint.

The chemical composition of mother's milk varies from day to day, and often from nursing to nursing, and as is well known, at different periods of the same nursing. Furthermore, the amount of inorganic constituents is rarely determined, and yet they play a very important rôle in the body metabolism. Substances such as nucleins, glycoproteids and lecithin may be more or less important factors in body growth. The value of the examination of mother's milk as it is ordinarily carried out is therefore over-estimated, and in many instances leads to false deductions and treatment. We feel, therefore, that a volumetric estimate of the child's food requirement is in the average case a more practical one. Heubner and others, in addition to stating the amount of breast milk required for growth at a given age, have expressed themselves in terms of calories. This is of some value, but on the other hand also is only approximate, as with the variation in the composition of mother's milk its caloric value also must change, and different authors disagree as to the average caloric value of 1 kilogram of milk. If we express ourselves in terms of calories, we must state whose figures we use in computing the calories. The caloric value of 1 kilogram of milk is given as follows: Rubner and Heubner, 650 calories; Gans, 722 calories; Schlossmann, 721 calories; Rehyer, 765 calories; Engel, 765 calories; Morse and Talbot, 782 calories.

Heubner's figures were used in computing the caloric requirement in the cases here cited, and we will use the same figures in order to facilitate comparison.

Energy quotient is the term applied by Heubner to the number of calories per kilogram of body weight per day that are necessary for growth. Remembering that after all each child is an individual, and that the caloric value of mother's milk in each instance was not calculated, we are not surprised to again find wide differences in the energy quotient quoted, as noted in different children observed. Heubner gives 100 calories as the quotient for the first 3 months, Schlossmann 110, Siegert 80, and Dennett 110 to 120 calories. Cramer observed an infant for the first 9 days, who gained well on 50 calories. Gans, quoted by Reuss, reports a case with a quotient of 44 calories for the first 10 days. Beck quotes the following as average figures:

1—12 weeks	=	107	calories
13—24 "	=	91	"
25—36 "	=	83	"
37—44 "	=	69	"

Finally we wish, as far as possible, to state the child's requirement of food in terms of grams of milk taken per meal per day. For a detailed account of the cases reported we will refer the reader to Czerny and Keller, Vol. 1, pages 392-406. The children observed varied considerably in weight, in other instances the number of feedings is not stated, and in 2 instances the report states that both breasts were fed at each feeding (Ahlfeld, Haehner i). We will here quote only the averages arrived at and conclusions which may be drawn from the figures published. The amount of milk taken at the individual meal, even on the same day, varies considerably, not infrequently as much as 50 to 100 grams after the first month. The amount taken at a single meal depends on the amount of milk in the breasts and the number of feedings per day. The total amount taken in 24 hours, however, for a given period of life is fairly constant, increasing of course with increase in weight and age. Engel claims that the infant, after the first few weeks, takes its largest meal in the morning, a lesser amount in the middle of the day, and again an increased quantity at the evening meal. We find in our case that this was quite often the fact but can not say, however, that we find it to be the rule. Gregor also has shown

that the total quantity taken at a single meal and over a period of time is somewhat dependent upon the percentage of fat in the milk. The amount of breast milk taken per day increases rapidly the first week, so that during the second week an infant will average 400 to 500 grams, then a gradual increase to about 800 grams by the eighth week, and approximately 1,000 grams by the fourth month. Rarely does the quantity exceed 1,000 to 1,100 grams. The quantity taken per kilogram weight per day usually increases up to the eighth week, reaching a maximum of 150 to 180 grams, rarely 200, and then gradually decreases to 110 to 125 grams per kilogram weight per day. Czerny says the young infant requires an amount of breast milk equal to $\frac{1}{5}$ of its body weight per day; $\frac{1}{6}$ to $\frac{1}{7}$ from the 6th to 18th or 20th week; and $\frac{1}{8}$ at 6 months of age; or in other words, at first it consumes the equivalent of its body weight in breast milk in 5 days, later in 6 or 7, and still later in 8 days. Camerer observing a series of 9 to 13 children over a period of 20 weeks gives us the following average figures for 1 day.

Day	1	2	3	4	5	6	7
Amount	17	91	193	309	352	391	467

Week	2	4	7	14	20
Amount	480	600	770	830	890

The figures stated up to this point are all averages obtained in children who varied in weight, but were all within normal limits and healthy. The figures I am about to report were obtained from weighings of my own child, Robert, whose birth weight was over the average (4,020 grams). He never showed an initial loss of weight. The weighings after the first 2 weeks were all done by my wife or myself. As the findings are those obtained from one individual child they will naturally not always coincide with the foregoing figures. The figures of other observers as well as my own merely show that these children did thrive on the given amounts of breast milk. They do not, however, demonstrate that the amounts given were the minimum amounts necessary for growth and well being. The following chart is self-explanatory, and gives the data obtained during 20 weeks of observation.

CHILD—ROBERT DIETRICH
BIRTH WEIGHT 4020 GMS.

Age in weeks	Wt. in gms	Amount of breast milk taken weekly.	Maximum amount taken at one meal.	Minimum amount taken at one meal.	Average per day		Average per day per Kg.. weight		Number of meals per day	Gain per week	Average gain per day.
					gms.	cal.	gms.	cal.			
1	4280	1995	85	25	285	185.25	66.5	43.2	7	260	37.1
2	4560	4920	120	60	702.8	456.8	154	100.1	6½	280	40
3	4690	4255	130	50	607.8	395.07	129.6	84.2	6	130	18.6
4	4870	4590	140	80	655.7	426.2	134.6	87.5	6	180	25.7
5	4950	4490	150	110	641.4	416.9	129.5	84.2	5	80	11.4
6	5120	4680	170	100	668.6	434.59	130.5	84.8	5	170	24.3
7	5280	5055	170	90	722.1	469.36	136.7	88.8	5+	160	22.9
8	5470	5405	200	100	772.1	501.86	140.8	91.5	5	190	27.1
9	5750	6030	250	90	861.4	559.9	149.8	97.3	5	280	40
10	5890	6130	230	100	875.7	569.2	148.6	96.5	5	140	20
11	6100	6140	240	100	877.1	570.1	143.7+	93.4	5+	210	30
12	6300	6420	240	120	917.1	596.05	145.5	94.5	5	200	28.5+
13	6340	5925	230	120	846.4	548.16	133.5	86.7	5	40	5.7+
14	6450	6510	280	130	930	604.5	144.1	93.6	5	110	15.7+
15	6690	6590	270	140	941.4	611.9	146.6	95.4	5	240	34.3
16	6900	6690	300	100	955.7	621.2	138.5	90	5	210	30
17	7070	7230	280	100	1032.8	671.3	146	96.9	5	170	24.3
18	7240	6790	260	100	970	630.5	120.1	78.06	5	170	24.3
19	7290	7210	300	150	1030	669.5	141.1	91.7	5	50	7.1
20	7410	7330	300	150	1047	680.5	141.3	91.8	5	120	17.1

PREMATURE SEXUAL DEVELOPMENT.

(*Report of case*)

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It is quite evident from the number of experimental and autopsy reports on clinically studied cases that diseased conditions of the pineal gland and adrenal cortex markedly alter the development of the sexual organs.

The pineal gland is a small organ situated in the brain just below the splenium of the corpus callosum and careful studies have shown its structure to consist of ill defined glandular substance, muscle and nerve fibers with a small amount of neuroglia. In the lower animal, it in all probability serves the purpose of a third eye. The gland undergoes involution changes before puberty and has been removed without any appreciable effects on life. Some able investigators doubt seriously if it has any effect on the development and maintenance of health. This is debatable ground and perhaps will remain so for some time, but a review of the literature will show many interesting cases, in which structural alterations have been found in this gland at autopsy, with changes in the sexual, somatic and appendage systems. Growths of the gland have not been noted in a large number of instances. Heubner in 1898 reported a case of a boy, 4½ years of age, who showed precocious sexual development and somatic growth. The body of this child was that of one 8 or 9 years of age; the genitalia corresponded to the proportion of those found at puberty. The pubic hair was 1 centimeter long. A year later an autopsy showed a teratoma of the pineal gland.

Marburg in 1907 was able to collect 40 histories of cases of this type. He sought to establish a clinical entity for such abnormal function. The term "macrogenito-somnia precox" was introduced but probably forgotten by this time. In a more recent paper he attributed the following characteristics to this condition:

1. *General.* This includes all the signs of intracranial pressure secondary to an internal hydrocephalus.

2. *Neighborhood*, from pressure on the quadrigeminate bodies, leading to ocular palsies and disturbance of the pupils, also disturbances from encroachment on the cerebellum such as ataxia.

3. *Constitutional*. This includes early sex maturity, enlarged sexual organs, pubic hair, general body hair, early changes in voice, precocious mental development, evidence of maturity in thought and speech, general overgrowth of the body to the extent that a 5 year old child may resemble in stature that of a child 10 years of age. Most of the cases reported by him occurred before puberty and in the majority of cases in boys.

The subject of the adrenal gland in relation to its internal secretion has received a great deal more attention than that of the pineal gland. Most of the investigation has centered around the medulla. For awhile it seemed that the cortex was completely forgotten. Much that was supposedly proven in connection with the medullary portion of this gland has had to be retracted, and, no doubt, further investigations are needed to clear up many hazy questions relative to the presence and effect of suprarenalin in the blood stream. We are not concerned particularly in this respect but more with the influence that the cortical system may have on the development of the sexual organs and the cortex of the cerebrum. From an embryological standpoint we are certain that there is an intimate association with the development of the genitalia. There is no longer any doubt from experimental work that during breeding the cortex increases in size. Hoskins has shown that feeding the cortical substance to animals has increased the size of the testicles. Quite a number of reports are found of cases with tumors of the adrenals with hermaphroditism, hypertrophies of the genitalia, precocious sexuality, early and excessive growth of the hair on the body and increase in size of the body growth. The following table will be of interest to show reports of cases in which tumors of the adrenals have been discovered:

NO.	OBSERVER	AGE	SEX	CLINICAL MANIFESTATIONS	NATURE TUMOR
1.	Bulloch & Sequera	11	F.	Hair on chin and upper lip, pubis, axilla, fully developed mammae, menstruation.	Hypernephroma
2.	Colcott & Fox	2	F.	Pubic hair.	Large celled sarcoma
3.	Dickinson	3	F.	Pubic hair and harsh voice	?

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NO.	OBSERVER	AGE	SEX	CLINICAL MANIFESTATIONS	NATURE TUMOR
4.	J. Ogle	3	F.	Hair all over body, mustache, pubic hair.	Large encephaloid cancer.
5.	Linser	5	M.	Pubic hair, precocious development of sexual organs, great growth of whole body.	Malignant hypernephroma
6.	Orth	4½	F.	Beard, precocious development of external genitalia.	Hypernephroma
7.	Dobbertin	1	F.	Hair on genitals.	Hypernephroma
8.	Tilesius	4	F.	Pubic hair, premature development of mammae.	?
9.	Wm. Cook	7	F.	Obesity, facial and pubic hair.	?
10.	Bevern & Romhilk		F.	Premature development of sexual organs.	Large celled sarcoma
11.	Ritchie	4	F.	Facial hair, notable muscular development.	Carcinoma

The above table is not compiled to represent a complete review of the literature, but in the 11 cases reported shows the characteristic symptoms present and types of tumor found. It is equally important to note the fact that reported in the medical literature are quite a number of cases in which tumors of the adrenals have been found in early life with no abnormal influence on the growth and sexual development of the individual.

That the adrenals are in some way connected with the growth of the cerebrum is shown by the well known fact that in a considerable number of cases of anencephaly a hypoplasia of the adrenals is present. Zander enlarged upon the ideas of Morgagni in this respect and came to the conclusion that the proper development of the adrenals could only proceed normally with the brain intact. The viewpoint of Alexander is, however, the reverse of this, viz.: that the adrenal hypoplasia is primary while the cerebral defect is secondary. It has long been known that the adrenals at the end of 3 months are larger than the kidneys; at the birth the kidneys have gained the advantage, while in adult life the proportion is 44 to 1. Glynn has given an excellent account of tumors and rests of the adrenal cortex with their relationship to sex abnormalities. The following is a brief abstract of his classification:

A. *Benign Tumors, Cortical*, Group 1. Diffuse hyperplasia

passing into: Group 2, Adenomata, which may be bilateral. The cells contain considerable amount of fat and their arrangement is like that of the zona fasciculata.

B. *Malignant Tumors, Cortical*, Group 1, Sarcomata-round celled, often lymphosarcoma, *i.e.*, small cells with alveolar arrangement. These occur in children between the ages of 2 and 3. Group 2, Hypernephroma, a tumor having large polyhedral cells resembling the structure of the adrenal cortex.

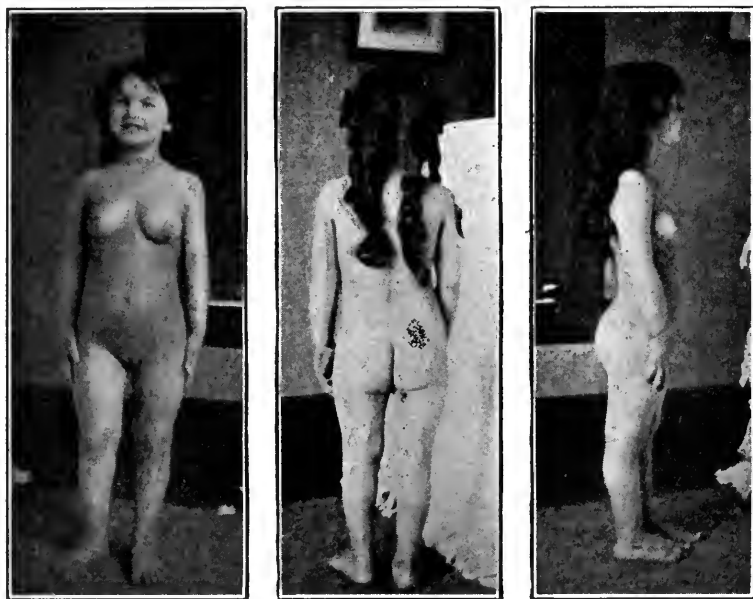


FIG. 1.—Case V. D.. These pictures, taken two years ago, show the premature development of the child. Since then there has been a development of pubic hair, the waist line has narrowed and the hips have broadened, accentuating the female type of pelvis.

Recently a case came under our observation with symptoms closely resembling the findings which have been classified above and attributed to internal secretory disorders of the pineal and adrenal glands. It emphasizes many of the points stated by other authors, but leaves much to be explained. The patient had convulsions and premature development of the sexual organs. An outline of the case is as follows:

CASE, V. D., aged 7 years, female, referred by Dr. G. W. Crile, for examination on account of generalized convulsions and an explanation of the premature development of the sexual organs.

From the parents the following information was obtained: The child at birth appeared to be unusually healthy and robust in contrast to the other 4, who were frail. At 2 years of age the breasts were noted to be unusually large and this opinion was confirmed by a physician called at that time. At 5 years of age pubic hair and well developed external genitalia were present. The child maintained a good state of health, but was above the average in height and strength for her age. Between 3 and 4 years of age light convulsions were noted which have increased in severity until they occur from 3 to 8 times in 24 hours, both diurnal and nocturnal. The menstruation was fully established 3 months ago and since then the parents are sure that the seizures have grown much stronger. The attacks are typical of those so often seen in epilepsy and are ushered in by a cry; loss of consciousness follows with clonic and tonic contractures of the extremities and right side of the face. Incontinence of urine usually occurs. The paroxysm ceases in from 1 to 3 minutes and the child awakens fatigued and scratches and pulls at the nostrils. Such an attack as above described was witnessed by one of us.

Physical Examination. Weight. 73½ pounds.

Height. 4 feet 4 inches.

General. The child when stripped had the appearance of being in excellent condition and her height and body development were above the average for her age.

Head. The cortex was flattened and the head increased in size in lateral and anterior posterior diameters. The left frontal, malar, and maxillary bones were much heavier in appearance than the right ones.

Hair. The hair on the head had grown luxuriantly and was dark and healthy in appearance. The axillary and pubic hair had reached its full growth. The eyebrows were normal and no hairy growth on the surface of the body noted.

Teeth. Nutrition was very poor; the teeth were widely spaced and practically all decayed.

Eyes. No exophthalmos. All ocular movements normal. No limitation in the fields of vision was present. Optic disks not examined.

Skin. No unusual dryness or moisture was noted. No edema

present. Skin was dark in appearance but was not bronzed or gypsy in appearance.

Glands. Thyroid normal in size. Mammary glands show the development of an adult woman.

Thighs and Buttocks were fully developed. The pelvis was broad and the child resembled a fully matured woman. The shaft of the femur was heavy in character.

Mentality is below the average. The child cannot read nor write. The memory is fair. Hearing and obedience are excellent. Speech greatly limited and articulations are like that of a mute.

Sexual Organs. The mons veneris is fully developed and the hair is limited to the space above the symphysis. The vulva is fully developed and the vagina easily admits one finger. The uterus and adnexa are of normal adult size.

All other organs not noted were examined and found to be normal. X-ray of the skull was negative, as was also blood and urine; 150 grams of glucose was given with no appearance in the urine. Circumstances made it impossible to give larger amounts and test tolerance.

COMMENTS AND CONCLUSION.

Hyperpituitarism with its influence on other glands is a possibility to be considered on account of the heavy character of the bones of the right side of the face and thigh. There was no chin prominence, no pressure signs in the cranium and the hands and feet in contrast to those of acromegaly are not disproportionately large. The sugar test in addition has shown no decrease in tolerance and the x-ray of the skull is negative.

In view of the limited knowledge concerning the pineal gland we are not inclined to attribute the findings to disturbance of that organ. This is especially so with the absence of pressure signs on the quadrigeminate bodies, normal eye movements, no hydrocephalus or pressure on the motor tract. The convulsions could be explained on the basis of the faulty development of the cerebral cortex. The cortical portion of the adrenals is probably the most likely to be at fault. No palpable tumors in this region were noted. Just what association can attach to the convulsions which appeared in this child's life after sexual organs had developed is an interesting point and brings up the question of

whether a hypoplasia of the adrenals has not been followed by some changes in the cerebral cortex, such as has been previously noted in anencephaly.

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INDICAN AND THE SULPHATES IN INFANTS' URINE IN HEALTH AND DISEASE (Rivista di Clinica Pediatrica, Jan., 1920, p. 1). Maccone remarks that on account of the difficulty of obtaining the total twenty-four hours' urine of infants he had to be content with specimens collected at different hours. There is probably not as much difference between the day and night urine of infants as later in life. Of the eighteen infants whose urine was systematically examined, twelve were less than a year and the oldest was only 17 months old. The children fed on cow's milk had a much larger indican and ethereal sulphates content than the breast fed, and the dyspeptic children had much more than the healthy children. The maximum was found in the children of the alimentary decomposition type, and those with grave digestive disturbances. Not a trace of either indican or ethereal sulphates was found in the healthy breast fed infants, and healthy artificially fed infants presented only traces of them. With severe digestive disturbance, up to 1 or, exceptionally, 2 cg. of indican was found per day, but the amounts were reduced to traces in the children with extreme athrepsia. With inflammatory processes in the intestines, the output of aromatic substances rose and fell parallel to the severity of the inflammatory symptoms except when there was much diarrhea. In three infants with athrepsia, he found traces of glucose in the urine.—*Journal A. M. A.*

MENTAL EXAMINATIONS AS AN AID TO PEDAGOGICAL METHODS IN THE PUBLIC SCHOOLS

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and

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Mental examinations are coming into such wide use as aids in caring for various classes of children that a discussion of their scope, their value, and, finally, illustrations of their practical application to special school problems must be of interest to all who are concerned with the care of children, as well as of very special interest to those whose main concern is public health in its widest sense.

A mental examination, as ordinarily given at the present time, includes far more than the actual testing, by more or less stereotyped methods, the performance of children in response to a set group of mental tests. To be sure, the so-called "intelligence test" is an important part of the whole procedure and is justifying day by day the confidence which workers have placed in it. Some form of a mental age scale is employed usually as a routine measure and serves as a fair indication of the child's ability to perform certain simple acts which serve as an index to his general ability. By such a scale the child's mental level is roughly determined—that is, his mental age is found—or, to be more explicit, a comparison is made of the child examined with the average child of his age. For example, if a child of 12 years can do only those things which the ordinary child of 8 years can accomplish, that child is said to have a mental age of 8 years. He is actually 12 years old, but his mental ability is only that of an 8 year old child. Experience in the examination of thousands of children has gone to show that when a child is more than 3 years retarded in his mental ability, that backwardness is serious and permanent and that the child in question will never be able to compete with normal persons under ordinary conditions.

But an age scale, such as has been briefly described, of which the Binet scale is the most commonly used in some of its forms,

is not in itself sufficient to determine the actual mental status of an individual. Certain factors may enter in and serve to make this method alone inadequate or misleading. For example, a child in whose home a foreign language is habitually spoken will probably fail to use the English language as readily as will the child from an English speaking household, and hence will appear less capable if tested without taking this one fact into consideration. Again, there are many children found among the failures in life whose main difficulty consists in a serious nervous instability and a lack of mental and physical control. These children frequently fail in tests because of restlessness and poor attention, and hence give the impression of having poor intelligence, whereas the real difficulty lies in their failure to make use of such ability as they have. Then, too, ill health may make a child apathetic and slow mentally, so that the results of a mental examination may be quite unfair, unless supplemented by a careful consideration of his condition otherwise. And, finally, the home training of the child has an undoubted effect on the quality of his performance. The dull child from the careful home may have been drilled and coached systematically until he makes a far better impression than his real ability deserves, while an untrained child may make a poor impression because of the lack of formal opportunities in his home. So if a mental examination is to be of real assistance to the individual child's problem, it is necessary to consider all of the other factors involved in making him what he is. Hence, the child is further questioned as to his interests, his amusements and as to the special advantages which he may have enjoyed outside of the school. He is also tested by being given mechanical and manual tests, so that, if a foreign language is interfering with his ability to answer questions well, he will still have an opportunity to show what he can do without the use of language. It is also of the greatest value for the examiner to have had experience in the observation of individuals from the physical standpoint. It is a remarkable opportunity for a physician to observe, during an hour's performance, the appearance, attitude and manner of the child being examined. Many a small point becomes noticeable which may be overlooked even in a physical examination, and it is rare that a child will be suffering from much of a physical handicap without its giving distinct evidence in his work or behavior. Then, added to the facts obtained from

the child, there must be information from others with whom he comes in contact as to his general character and his relation to other children and as to his home surroundings, with special reference to the social and moral standards of his parents or relatives. So it will be seen that the individual mental examination, to be satisfactory and fair, is a comprehensive thing, corresponding more and more with the tendency to judge of feeble mindedness by social standards rather than by mental or intellectual methods alone.

Such a mental examination as has been described here must necessarily consume a considerable amount of time, not only in the matter of obtaining the necessary facts, but also in correlating and weighing them in making plans for the child. Ideally, every child in the schools should be given just such a thorough study, but while this work is still new and where the workers available are so few in number, it is, of course, quite out of the question for the majority of school children, and hence must be reserved for those who are failures or who present such obvious peculiarities of one sort or another that special plans are quite necessary for their care. There are occasions, however, when wholesale examinations of entire schools or districts are desirable, when a rough determination of the extent of serious mental deficiency is the end to be sought. For this purpose, briefer and much more rapid and mechanical methods may be used, and although the results in the case of certain individuals may be inaccurate, still the situation as to actual feeble-mindedness in the entire group can be determined with fair accuracy. If all children who make a satisfactory record in these more superficial surveys are then excluded as being presumably normal, those who fall below a certain rank may be examined in the more careful and intensive way and special plans may then be made for their necessary care or treatment. Such a study would constitute a satisfactory survey of the school children of any community.

The value of standard and more or less exact methods of comparing the performances of children is obvious. A careful mental examination will help greatly in setting standards to which the individual child should be held. The complaint is sometimes made that children are lazy, that they could do certain tasks if they would, and hence a child may often be blamed by a teacher

for wilful lack of effort, when, in reality, he may have some special disability or inability which effectually prevents his acquiring certain types of knowledge with ordinary ease. A child may fail of promotion again and again because one or two subjects are difficult for him, even though his ability is for the most part quite as good as the average. A careful examination of his real ability along other lines and an adjustment of the school program to care for his needs may help to add another responsible citizen to the community, rather than to develop an individual whose mind has been trained to accept the idea that he is a failure. It is a very unfortunate thing for any child to get into the habit of failing and of accepting the fact that only failure is to be expected of him.

A mental examination will also aid greatly in pointing out those children who are beyond question feeble-minded and who should be under close supervision for the rest of their lives. Such a child as one of these is entirely out of place in the ordinary schoolroom. He uses up a great proportion of the teacher's time, and as a result those other children who are later to become responsible, self-supporting citizens are neglected. This is not only quite unfair to the normal children and their parents, but is obviously foolish and extravagant.

Another and an important value of mental examinations is in their use for the purpose of refuting hasty judgments as to the presence of mental defect on the part of children who may be troublesome in the schoolroom. When a teacher is worried by a badly crowded school it must be a great temptation to wish to get rid of troublesome children, and it seems to be becoming quite customary to judge a child as mentally incompetent as soon as he becomes a disturbing element. It is undoubtedly an important advantage to point out the fact that such a child is not a defective. He may be erratic and untrained or his home life may be having a bad effect on his ability to do any effective mental work, but although these troubles may often be associated with the presence of mental defect, still a child may be a misfit without being feeble-minded, and it is then the responsibility of the teacher to remedy, in so far as is possible, those things which cause failure, rather than to feel that the child must be gotten rid of because, if he were not defective, he would not be so troublesome.

Thus far, in San Francisco, the plans for caring for defective or unusual children have not been developed very extensively, but such provisions as have been made are on a sound and permanent basis and the possibilities of expansion from time to time are good. There is one ungraded school, under the Board of Education, situated in a poor and foreign part of the city, to which children from all parts of the city have access. This school is a thoroughly modern institution for defectives of the more serious type, and contains for the most part children who will be inevitable social failures unless given permanent supervision. This school, with four rooms and a capacity for training 60 defective children, gives a most excellent opportunity for close observation and study of the children attending its small and intensive classes. It can scarcely be possible for a youngster to leave such a school without its having been estimated fairly accurately what his capacities are and what can be expected of him as an adult. Besides this school, there are special classes which care for defective children in other parts of the city, where the greatest need arises. The ungraded school and the special classes are under the same general supervision and control and the same methods are used in all. In fact, the main ungraded school is used as a training school to prepare interested teachers to take charge of special classes for defectives. In this way provision is made for a satisfactory increase in the number of workers who will be able to teach abnormal children. In all, approximately 140 children attend the ungraded school and the special classes, and nearly all of these children are very seriously retarded mentally.

In addition to these classes, which care for the institution type of defective children mainly, there are several other classes which go by the name of "opportunity classes." In these classes there are to be found children of a much higher grade of mental ability, but for whom the regular work of the upper primary grades is too difficult. Many a child begins to hold back when he has gone as far as the fifth or sixth grade in school, and if held to the standard possible for the average child and the bright child will absolutely fail to finish his grammar school work and will leave school, branded as a failure. For just this type the opportunity class has been developed, and its aim is to give to the child special elementary drill in those subjects which will be of the

greatest practical value to him later in life, so that he will have the fundamentals of a grammar school education, and to omit such special subjects as music, drawing, foreign languages and the like, all of which have their great value, but can better be omitted than can such subjects as reading and arithmetic. The child may in this way be carried along and may learn in his slower way much more than he could possibly get when surrounded by brighter children and confused by the more complicated curriculum which makes school work most interesting to the child without mental limitations.

The actual systematic work of caring for the mental examining of special and defective children in the San Francisco public schools has been undertaken by the Department of Public Health and is under the supervision of a medical psychologist, trained both in medicine and psychology. Thus far the work has of necessity been on an experimental basis and has been more in the nature of emergency work, rather than actual systematic study of conditions over the city. The ultimate object will, of course, be a survey aiming to study conditions over the entire city, but the workers are still very few in number and the population of San Francisco is large, so that such a task is still somewhat in the future. At present, careful mental examinations are being made of such children as constitute a special problem or who are failing systematically to make such progress in school as is possible to the average child. Lists of such children are made out by the teachers and turned over to the psychologist and mental examinations are then made as speedily as possible. On the basis of the psychologist's recommendation, children may then be placed in one of the ungraded classes for low-grade defectives or in one of the opportunity classes for the dull but on the whole normal children. When the bulk of this emergency work has been completed, plans will be made to make a more systematic study of all of the children in some of the poorer districts where the greatest amount of school retardation exists. Then, gradually, it is planned to increase the work as opportunity arises until a study of the public schools of the whole city has been completed. Plans are already in the process of making toward this end, although the actual work has not as yet been begun. There is fairly close coöperation with all other public agencies, and when necessary or desirable the assistance of the juvenile court, of the clinics and

hospitals of the city is asked and given freely. Work of this sort, to be far reaching in its results, must be well known and understood in the community, and the larger the number of individuals and agencies concerned in the care of defective children the greater will be the understanding of the problem and of the need for care and protection of these unfortunates, both for the sake of the abnormal child and for the protection of the community from unnecessary poverty, vice and criminality.

During the first year of work in this department, there were 363 children examined in 10 of the public schools. With the exception of the children examined in one of the large intermediate schools, all were referred as defective or very peculiar children whose removal from the ordinary grade room was deemed by the teacher as being very desirable.

Only 1 survey which could be called at all systematic was attempted, and that was at 1 of the large intermediate schools whose population is nearly 1,000 children, all of them in the sixth, seventh and eighth grades. This school was selected at the suggestion of the Board of Education, because of the very great interest of the principal in mental examination.

PSYCHOLOGICAL EXAMINATIONS GIVEN 3 GRAMMAR GRADE CLASSES IN AN INTERMEDIATE SCHOOL: The general purpose of this particular investigation was to throw some light and to offer some practical suggestions, if possible, upon the problem of eliminating the wastage to the teacher, to the child and to general educational efficiency which occurs in all school work where those to be instructed include so many types of mental makeups, so many strata of mental capabilities.

The specific purpose of the investigation was fourfold:

1. In the first place, to find those children who are so far mentally retarded or deficient that they are unable to profit by the regular work of the classroom. These children—and every teacher who has taught in the elementary or grammar grades has run across this type—are wasting time and energy in a variety of ways:

- (a) They are trying to do what they are incapable of doing.
- (b) They are not receiving the special training which they are capable of taking.
- (c) They are a drain on the teacher, who must of necessity

give disproportionate attention to these unfortunates who, mentally below par, have no alternative other than being a drag on the class.

(d) Their presence in the regular class is a great disadvantage to those children who are able to profit by regular school work, but who do not get the maximum of benefit from their school experience because the teacher cannot give them due consideration.

The obviously economical thing, financially and educationally, from the point of view of the teacher, the normal child and the mentally defective child, is to locate and segregate defectives or subnormals into classes where they may receive such practical instruction as they are capable of receiving profitably.

2. A second aim was to discover those children who are capable of profiting by their regular school work, but who because of some peculiar defect or because of being innately slow or dull, cannot keep up with the average speed of the regular class, and who need special help to carry them along. Often it develops that a child of this type who can never do regular academic work well shows relatively good mechanical ability. If, in addition to this, the financial status of the home requires that the lad shall go to work when finishing the grammar grade, his schooling will mean most to him if it has given him training along mechanical or vocational lines. In his case, less emphasis can be laid upon abstractions which are extremely difficult for him to grasp and more emphasis upon practical concrete problems and training. Again, it would appear that a maximum degree of benefit would accrue by grouping this type of children, giving the boys the advantage of additional shop work and the girls additional sewing and cooking, and to both special drill in such academic work as would be of value to them. And among this group, as in the other groups, special help could be given to the boys or girls who showed some peculiar disability. For example, in the case of a child who had a very poor auditory memory and a fairly good visual memory, it could be suggested to the teacher that a greater preponderance of visual explanation would enable the child in question to grasp the idea more quickly and to hold it more accurately. And again, special help and stimulation could be given to those children who showed on investigation some

peculiar or special ability which might be stressed to the advantage of the child.

3. A third purpose was to locate those children who were doing poorly in their school work, but who had no mental disabilities or deficiencies. That is to say, if the school report showed unsatisfactory scholarship and the psychological examination showed the child to be of normal intelligence, an effort could be made to locate the source of the difficulty.

Perhaps the trouble might have a physical basis, as for example, defective vision or defective hearing, or adenoids or infected tonsils. Again, the unsatisfactory school report might be due in part to an incomplete recuperation from some severe illness, such as influenza, or again it might be due to some debilitating habit which had a physical effect. Any child who showed obvious need of a physical examination or whose mental performance suggested that a physical examination might throw helpful light on his case was recommended for such an examination.

Again, the cause of the trouble might lie in irregular home conditions, such as poverty, viciousness, improper supervision. For example, take the case of one girl in the sixth grade who said that she went to the movies or to the beach every night. Lax home supervision of that type would necessarily react on her school performance.

4. Again, it was a purpose of this investigation to discover those children with intelligence above the average that they might be given instruction according to their abilities and not be held back to the speed and type of work that fitted the average.

The work was undertaken with the feeling that psychological examinations, including intelligence tests, performance tests and the gathering of information concerning the child's home conditions in conjunction with his school report could help in making these above-mentioned segregations which seem so educationally desirable. But so that others, not familiar with this shortcut method of classification, might share this assurance, it was necessary to show the practicability of the tests, to compare the teacher's estimate of the child's success in his school work with the psychologist's estimate on the basis of intelligence tests.

To make this comparison as accurate as possible, the three

classes examined were selected from one school. Similar school conditions, gradings, and methods of instruction, would maintain; hence, results would be more accurately comparable. The school was the Horace Mann Intermediate, located in the Mission District, in which no special foreign element predominates, as in some sections of San Francisco. Departmental work—different subjects taught by different teachers—being the method of instruction, meant that the scholastic estimate which would be used as a basis of comparison would not be one teacher's judgment, but the combined judgment of several teachers.

GROUP 1: The first class to be examined was a special class of 50 children, ranging in age from 13 to 17 years, the majority of whom were either 14 or 15 years old. This group of 50 children had been segregated into a special eighth grade class by reason of the fact that in some respect their school performance was below average. For the purpose of giving them more individual help and coaching, by teaching them in small sections, they had been grouped together, and then subdivided into small reciting groups, one group stressing arithmetic, another grammar, etc., according to the subject which required additional study on their part. This segregation had been in process since as sixth graders these children had entered the school. It covered a period of 2 or 2½ years and was based on the definite failure of the child in the regular schoolroom.

There were 2 reasons for selecting this group to examine:

(1) The discovery of the causes of their poor scholarship and of each child's peculiar abilities or disabilities.

(2) Being problem cases, they had demanded special observation on the part of the teachers, and hence were better known than the average child. Therefore, the teacher's estimate and that of the psychologist would form a particularly interesting comparison.

A few words of explanation as to the nature of the examination:

Each child was examined individually.

The following information other than that elicited by the intelligence tests themselves was obtained in every case, in order that the recommendation might be based upon as full a knowledge as possible of the child's complete environment—his home, school and social relations:

(1) Nativity of child. Special considerations in the case of the immigrant child are necessary.

(2) Nativity of the parents. The child of the foreign-born parent who does not become Americanized as quickly as the child presents an abnormal home condition.

(3) Occupation of the father and mother. This is often suggestive of the economic status of the family, whether there is plenty or actual want in the home.

(4) Information as to whether the home is normal, in that it is not broken by the death, desertion, or separation of the parents. If the father is dead, it often means that the mother must work away from home and that the children of necessity are left unsupervised and without proper care. The loss of a mother may mean that the home is broken up or that a girl in the family has to bear the burden of the housework in addition to going to school. Home conditions are bound to influence tremendously the child's school performance. With this information in the hands of the teacher, she may ease matters considerably and let her helpful influence be carried into an unfortunate home.

(5) Information as to the health of the family. A record of tuberculosis in the home, for example, in the case of a child who shows early signs of mental fatigue during the examination would indicate the need of a physical examination for a possible infection in the child.

(6) Information was also secured as to what the child intended doing upon finishing the grammar grades. Did he intend to go to high school, to business college, or to work? If to work, what sort of work? A child who either by force of economic necessity, or because of disinclination to go further, intends to quit school when he finishes the grammar grades or when he reaches the age of non-compulsory school attendance presents a somewhat different educational problem from that of the child who intends to go to high school and college and become a brain worker rather than an artisan.

(7) The child was also questioned as to his interests, occupational and recreational; inclination or interest in doing mechanical work where native mechanical ability existed might advantageously be focused into actual intention. On the other hand, a girl who wanted to become a stenographer and showed no manual

dexterity and a marked inability to react quickly should be discouraged from attempting a line of work at which she could not succeed.

This information, together with the results of the intelligence tests and several mechanical performance tests, was used as the basis of discussion with the teachers and the principal, as to what would be the best educational suggestion for each child considered individually. As a result of these conferences the pupils were regrouped and rearranged.

Results of a Comparison of the Teacher's Estimates and the Scoring of the Tests in Regard to this Special Group of 50 Children: Of the children who graded relatively low by the tests all were doing poor work in this special class. There were in this class some 5 or 6 who showed intelligence of a good order. One of these, and the only pupil of the entire group concerning whom the teachers and the examiner differed absolutely, was a lad who was doing extremely unsatisfactorily in school work. His performance in the intelligence tests showed that he could not do it. He was examined last term. This term the teachers report that he is doing very good work. Some other factor, probably a lack of interest in his school work typical of the adolescent lad some time or other in his school career, was keeping him from doing the type of work of which he was mentally capable.

The other children, who by the tests graded somewhat above average, were children who were having special difficulty in one subject, and that subject was arithmetic.

Conclusions: The investigation of this special group showed clearly enough, that—

- (a) The backward child in school could easily be picked out.
- (b) That the same results, for which the teachers and principal were compelled to spend from 1 to 2½ years, could be done on the basis of psychological examinations at the rate of one pupil per hour and a quarter—the average length of an examination.
- (c) This was possible without the necessity of the child's suffering the discouragement of failure and coincidentally the actual loss in not receiving the type of training which he was capable of taking.

GROUP II: The next group to be examined was a regular

eighth-grade class which pedagogically was adjudged to be an average class. This class was chosen for the purpose of ascertaining whether or not the intelligence tests would be as accurate in locating the child who was doing excellent work in school as it had been in locating the backward child. The same program was followed as in the special class. The same span and type of information was ascertained in each individual case.

The tabulation below shows the interesting relation between the intelligence score and the gradings given by the various teachers. The psychological gradings have been roughly divided into three groups.

- (1) Those having a mental age of 15 years. (Above average.)
- (2) Those having a mental age of 12 years. (Average.)
- (3) Those having a mental age of less than 12 years. (Below average.)

COMPARISON OF MENTAL STATUS AND SCHOOL REPORT.

Mental age	Number	Excellent	Good	Fair	Unsatisfactory	Promoted	Not promoted	Promoted on trial
15	17	11	3	2	1	17	0	0
12	19	1	6	7	12	12	2	5
12 (minus)	10	0	0	1	9	1	7	2

Remarks: (1) Seventeen out of a class of 46 had a mental age of 15 years.

- (a) Eleven out of the 17 were doing excellent work.
- (b) Three were doing good work.
- (c) Two were receiving one or more "fair" marks.

One of these was a lad having difficulty with arithmetic; the other, a girl, was a discipline case and her poor marks were definitely due to her deportment.

(d) One lad of this group was receiving unsatisfactory marks in arithmetic and deportment. The low grade in arithmetic was absolutely traceable to his poor conduct, because he was able to do, when tested individually, relatively difficult arithmetical problems.

The important thing to note is that out of this group of 17 *all* were promoted unconditionally.

(2) Of the second group, grading 12 years by the Binet scale, there were nineteen.

- (a) Only 1 of these was an excellent student—a lad of 13.

(b) Six were rated as good in their work.

(c) Seven were fair.

(d) Twelve were doing unsatisfactory work in arithmetic according to their grades. Five of these were receiving unsatisfactory marks in some subject other than arithmetic.

Twelve out of the 19 were regularly promoted. Five were promoted on trial. Two were held over and not promoted. These 2 were Italian girls, natively slow but not sub-normal, who had missed considerable of the term's work on account of influenza. On the whole then, this group was doing passable work.

(3) Of the third group, those who graded *less than 12*, there were ten.

(a) There was not an excellent pupil in the group.

(b) There was not even a good pupil in the group.

(c) There was only 1 who graded as fair, a girl of 13 who graded slightly under 12.

(d) All but 1 of the 10 were doing unsatisfactory work, and that 1 was just above the line.

Only 1 of this group was promoted. Two were promoted on trial, and these 2 are doing such poor work that they will have to be held over this term. Seven could not be promoted, even conditionally. All but 1 of this group, then, who graded below 12 years mentally were not doing passable work.

Conclusions on the results of a comparison of the teacher's estimates and those made on a basis of psychological examinations:

1. The correlation between the 2 estimates is extremely high, almost a perfect correlation, save for some 3 or 4 cases.

2. Those cases which do not closely correlate can definitely be explained by some factor other than intelligence entering to interfere with the performance of which the child is mentally capable, as, for example, sickness, or some peculiar mental disability. Those cases where there is an absence of correlation point to the need of further study of the particular child to find *why* the child's performance in school falls below what one should expect on the basis of his showing in the intelligence tests. Is it due to physical condition? Is it due to irregular attendance? Are there unsatisfactory home conditions? Is there some temperamental or emotional peculiarity?

3. The practical significance of the correlation means that segregation and grouping necessary to educational efficiency, which by present schoolroom methods requires 1 or 2 or more years and is based on the actual failure of the child, can be made on a basis of intelligence tests when the child enters the grammar grades, or preferably before then, without submitting the child to the discouragement of failure and the concurrent waste of energy on the part of the child and the teacher.

GROUP III: The next group to be examined was composed of 50 children who had been sent from various primary schools to a special class for backward children in this school. They were classed as fifth and sixth graders. The teachers in charge discovered soon after the term began that they had almost a hopeless mixture—children who could get nothing out of the work, children who were backward and could be helped, children who could do satisfactory work in a regular class and who had evidently been shoved by other schools into this class because they were discipline cases.

Psychological examination showed the following mental classification:

Seventeen were feeble-minded. That is to say, they showed 4 or more years mental retardation.

Nineteen were classed as borderline cases—some of them potentially defective. These showed 3 years' mental retardation.

Six showed a mental retardation of 2 years.

Four showed a mental retardation of 1 year.

Four were children of normal intelligence.

The chronological ages of the group ran from 12 to 16; by far the larger percentage of the class were 13 and 14 years.

The report of the teachers showed that all the children who graded less than 10 years mentally were complete failures in this class for backward children. They were incapable of doing even the most diluted fifth or sixth grade work. If they are to get anything out of their school training they must be given manual work, not mental work. There were 16 of this group who graded less than 10 years mentally, and hence should be transferred to a class for subnormals.

The 4 children who graded as normal were hard to manage in this class because the teacher could not keep them busy. They were boys who obviously were discipline cases, and should never

have been put into a class with backward children.

The children who showed only 1 year's retardation mentally should be, and since then have been, transferred to a class of average ability.

Those children who are seriously backward are now in a class by themselves, and can be given the type of work which they are able to grasp, and at such a rate as they are capable of taking it.

Finally, we feel that the results of 1 year's work along the lines indicated herein prove conclusively that there is a place for the medical psychologist in school medical inspection and justify the extension of the work we are trying to do, besides presenting a strong argument against the promoters of our new state statute, which allows parents and others to protest against examination of their children, any number among which might be defective, and retard the greater mass of normal children.

RICKETS IN RELATION TO HOUSING (Glasgow Medical Journal, 1918, i, p. 268).—L. Findlay during the past three years carried out an extensive research into the conditions, dietetic, hygienic, etc., of actively rachitic and non-rachitic children belonging to the same social class. The most important factors, in order of significance, were: (a) Improper housing; (b) absence of facilities for open-air life; (c) imperfect parental care. It was found that the rachitic families did not spend as much on rent as the non-rachitic families and they would thus be supplied with inferior houses. The frequency of rickets was directly proportionate to the air-space in the house available per person and also to the opportunities of open-air exercise. An interesting comparison is drawn between conditions in Port Sunlight and in Glasgow. The author thinks that the want of care on the mother's part is usually not due to indifference to her responsibilities, but simply to the fact that as a result of her unfavorable surroundings she has lost all interest in life and the vitality to contend against them.—*British Journal of Diseases of Children*.

SPEECH DISORDERS AND DEFECTS

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The department of Speech Correction in San Francisco was first opened as a Speech Clinic in the Pediatric Department of the University of California Medical School in 1915. This clinic has been held Saturday mornings for the accommodation of school children. The cases are divided into groups, according to the type of the defect, and are given class instruction wherever possible and individual treatment in unusual cases. In general the speech defects are classified under 4 heads. The first to be considered are the speech disorders, found more among the psychopathic types of children. These include stammering, stuttering and cluttering. For convenience in recording these cases, stammering is defined as a spasmodic action of the speech muscles; stuttering as repetition of the initial sound of a word; and cluttering as rapid, choppy, indistinct speech.

The second group have neurotic, organic or sluggish articulation of the elements of the language. Many of these are infantile mistakes such as lisping and other substitutions of sounds. By organic is meant the malformations of the speech organs such as teeth, palate, and jaw defects and nasal or throat obstructions which effect speech. Still another group of children are trained in this division who have not defective speech in the same sense as the others but who mispronounce the English elements because of a foreign language environment.

The third group have sluggish enunciation due to a careless use of the jaw and lips. These have disagreeable voices. Among these are the nasal, harsh, high pitched, weak, hoarse, tense or thick voices.

Outside these regular types are the cases of aphasia, aphonia and mutism. Cases belonging to the last type are examined first for hearing defects, next the mental tests are given to determine whether mental deficiency is the cause or whether the absence of speech is due to aphasia. The aphonia cases may be due to hysteria, to a partial paralysis of the larynx muscles, or to tumors in

the throat. In cases of marked retardation of speech, a careful investigation is made of the environment and heredity of the children. Tests are made to see if this retardation is due to arrested mental development or to other causes. Some children have a combination of 2 or more of these defects or disorders.

A careful history and record of progress is kept of each case. Children who need the attention of a physician, surgeon or orthodontist are referred to these departments before any speech correction is attempted.

Referring again to the first group, the psychopathic type of children, an entirely different line of treatment is pursued than that given to the other cases because of the peculiar nature of the disorder. In former years, the outward manifestation was mistaken for the cause. Accordingly various operations were performed, nerve tonics were given and mechanical devices were worn in the mouth. All of which proved to be ineffectual. Neurologists now classify this manifestation as one of the neuroses caused by a severe fear shock, which was in some way associated with the effort to speak. The original experience may be forgotten but by the unconscious association of ideas the disturbance in speech continues. In some instances there is a history of a particular shock followed by the appearance of the speech disorder. Among these might be mentioned a case where a child saw a companion burned to death. In another instance a child just escaped drowning. In most cases the parents are unable to account for the disorder.

In the treatment of these cases a careful study has to be made of each child, as heredity, environment and experience are important factors to be taken into consideration. Some children are keenly sensitive to ridicule and very early develop self-consciousness and a feeling of inferiority. This has a warping effect upon the child's psychological development. Often his general health is greatly impaired because of worry over his inability to recite in the schoolroom. In some cases he prefers to be considered stupid and pretends that he does not know his lesson rather than subject himself to the agony of conflicting emotions which result from the attitude of thoughtless schoolmates. Therefore it is necessary to build up confidence and poise and in every way to counteract the effects of the humiliating school experiences. The physiological speech drills bring about a conscious

control of the entire speech mechanism and serve the purpose of giving the child a concrete proof of his ability to control himself. The emotional training is very important if these children are to be fitted to meet the difficult situations away from the home protection.

The articulation cases mentioned in the second group, require individual instruction. In many cases children may have perfect hearing and yet fail to perceive the sharp distinctions in sounds. The acquirement of normal speech is the result of 4 processes. The first is the receiving of sounds by means of the ear, the second is the registration of these sounds in the auditory speech center of the brain, the third is the association of ideas with these sounds and the fourth is the reproduction of these sounds by means of oral language. The first step in treating a case is to examine the hearing. If that is normal, the next step is to use every means to quicken the perception of the differences in sounds. The mirror and pictures showing the contact of the tongue with the palate will give a visual impression of the physiological formation of a sound. When the new position of the tongue is taken, the child gets the tactile and a muscular sensation in the speech organs which is necessary to produce the required sound. Considerable drill is given until the new habit is formed. The lessons are given in steps of progression from the simple sound to all its combinations in words and sentences. The element that gives most trouble is the hissing sound found in words like salt, cell, or box. Some children substitute the "th" sound, as thalt for salt, thell for cell and bokth for box. Others make a thick cluttered sound instead of the sharp hiss. All cases show improvement from the careful drills. Even the mentally deficient make considerable progress.

Often a child's speech has so many substitutions of sounds that it is almost unintelligible. Frequently such children are classified as mentally deficient and unequal to any school recitation. But in many cases a few months of instruction and home co-operation completely clear up these defects. In the mentally deficient these articulation defects are frequently found in degrees ranging from no speech, unintelligible jargon, substitution of many sounds up to ordinary infantile mistakes known as "baby talk."

Voice defects are sometimes due to nose and throat obstructions or to a sluggish condition of the muscles after an operation for their removal. Often, however, the fault lies in a lack of ear training and proper tone placing. To meet these conditions, exercises are given to develop breath and diaphragm control, a voice free from tension, well modulated, having resonance and a pleasing quality. In some instances the fault lies farther back. Environment may bring about a chronic state of irritability which is reflected in the voice. Other emotional states are reflected in the voice, also. If a pleasant speaking voice is to become a habit the imagination must be awakened and the desire to interpret selections of the best literature should be stimulated, showing the possibilities of such interpretation through the medium of a beautiful speaking voice.

Sluggish enunciation is often due to carelessness and the lack of training in good speech. Exercises for developing the habit of a free jaw and lip action result in a clear distinct enunciation.

The same work is being carried on in the public schools under the direction of the writer who is also training teachers to assist in the handling of hundreds of speech defects. General speech improvement is being introduced as fast as the training can be given. In proportion to the school attendance, the San Francisco schools have the largest speech department in the country. The work begins in the primary grades and extends through the high school. The city is divided into districts and the classes sent to centers where the director and an assistant meet a different group each day, covering the city in a week. This is repeated each week and the instruction is followed up by a teacher from each school who attends the center, observes the corrective lesson and gives it to the pupils who need help in her own school.

Under the University Extension division, classes for the training of teachers in this field are being conducted. In addition to these practical courses, lectures on the theoretical background of speech defects with the pathological and therapeutic aspects are given by the Neuropsychiatry Department of the University Medical School.

Heretofore, very little attention has been given to the pedagogical phase of the correction of speech defects because no one had brought together all the correlated subjects and worked out

a plan of classified instruction. But now this has been done. Material has been prepared to meet practically every case of defective speech. Therefore, no child should be allowed to grow up handicapped by a defect in speech.

DRUGS IN TREATMENT OF CHILDREN — Klotz (Therap. Monats., Berlin, March, Vol. XXIX., No. 3, pp. 129-192) comments on the complete failure of treatment of rachitis to date on the basis that it is the result of disturbances in some one internal secretion. Neither thyroid nor epinephrin treatment has displayed the least efficacy, nor hypophysis nor thymus extract. Of course if any treatment is begun just as the rachitis is spontaneously subsiding, "astonishing results" may be obtained with or rather in spite of the treatment. Calcium alone is equally ineffectual, but given with phosphorus and cod-liver oil, the desired result is realized. Recent studies of the metabolism by Schloss indicate that the phosphorus can be dispensed with. The calcium can be given in the form of 1 or 1.5 gm. of calcium acetate (calc. acetic.) daily. Another field in which calcium is useful is in melena of the newborn. Whatever the scientific explanation, the melena may be arrested by subcutaneous injection of 3 or 5 c.c. of a 5 per cent. solution of calcium chlorid (CaCl_2 with gelatin. Or serum or gelatin may be injected and calcium acetate (10 c.c. of a 5 per cent. solution) or calcium chlorid crystals (10 c.c. of a 10 per cent. solution) be given by the mouth every two hours, lengthening the intervals after 3 gm. has thus been taken. Klotz has never witnessed any benefit from calcium salts in prophylaxis or treatment of catarrhal affections or serum sickness. The main field for calcium treatment is in arresting a tendency to spasms and convulsions. From 8 to 15 gm. of the calcium chlorid must be given in the first twenty-four hours, and most of it during the first hours. With calcium acetate this dosage should be reduced one-third. The drug is then continued for three days, giving 1.5 gm. calcium chlorid or 1.25 calcium acetate six times a day, gradually reducing this until by about the tenth day 4 gm. is the daily dose, and this is kept up indefinitely. In case of a relapse, the course is begun anew with three of the initial doses and then five doses a day of 1.5 gm. of calcium chlorid or 1.25 of calcium acetate.—*Journal A. M. A.*

MISCELLANY

A MOTHER'S INSTRUCTIONS TO A NEW NURSE.*

You are probably finding it rather difficult to get the children to obey you at once. I am, therefore, going to write the following hints, which may help you and give you an idea of my own methods. I look upon it as vitally important that they should obey at once even in unimportant things such as "come into the garden now," because if they get into the habit of hesitating to obey one can imagine an occasion when it might mean death to one of them. For instance, if "come into the garden" is not obeyed at once, "don't step off the pavement" might equally be disobeyed with terrible results:

1. Never give a tentative order such as, "I think it is time you came in," say "come in now." Always conclude that your order will be obeyed at once until you see it is not. For instance, don't say "come in now" and at the same time walk towards the child to take its hand to lead it in, but say "come in now" and turn yourself towards the house.

2. If possible never show annoyance. For instance, repeat an order if necessary in exactly the same voice, because otherwise they will wait until you are annoyed before they will obey.

3. Never show surprise at wrong doing. For instance, "Oh! Pauline, you are not pouring water on Molly, are you?" Say, Pauline, stop pouring water on Molly."

In case of disobedience. 1. I give the children 25 cents each, good conduct money, on Monday morning if their conduct has been perfect for the preceding week. I keep in a book the number of marks, each 1 cent, taken off for little things, such as dawdling when told to do something, touching things that don't belong to them when they know they shouldn't, saying "why," not to gain information but to delay obeying, etc. You can also take off marks and let me know every evening whether you have taken any off or not, so that I can enter them into the book.

To give an instance, if you should say "come into the garden now" and they should not have obeyed by the length of time it takes to count about 10, just say, in a quiet tone of voice, "one mark off"; then repeat your order, using the same words and voice as before. If disobeyed the second time say "four marks

*These simple hints to a nurse, devised by a young English woman, have appealed to the Editor as well worth being printed. They are modeled on military standing orders and are designed for the benefit of a woman who had never been a nurse before.

off," and if disobeyed a third time say, "no cake for tea," or "stand in the corner for 5 minutes," whichever is most convenient at the time.

2. You must always win no matter what uproar it creates, but never under any circumstances slap or have recourse to corporal punishment. (I feel that it is quite unnecessary to say this to you, but I am putting it down with the rest.)

3. The "no cake," or "corner," may lead to a bad outbreak of temper. The best thing to do then is to put the child to bed and leave her there till she is quiet. This has only had to happen very rarely.

4. Always be firm and get your own way wherever you are and whoever is there. Giving way to a child to save a scene in the street or on the stairs only lays up trouble for a future occasion. Children can see so quickly whom they can get the better of, and they are in the long run happier with, and fonder of, the people who can control them. Pauline and Molly never bear resentment for just punishment.

5. Never give an unnecessary order. Remember, it is more important that they should be jolly and happy than that they should have clean clothes and perfect manners. The object of all the foregoing notes is in order to cut down "don'ts" and "mustn'ts" to the minimum. I think that their very exuberant spirits have been greatly helped by this system.

General Notes. 1. The children have no idea about being frightened in the dark because it has never been suggested to them, directly or indirectly, that there is anything in the dark to be frightened of. For instance, they have never been asked if they were frightened or praised for not being frightened. Never say "it's all right, I am in the next room."

2. They have no fear of anything supernatural, as they have never been told stories about spooks, bogies and ghosts, which terrify children so. When I tell them fairy stories I always say they aren't really true but just imagination stories, such as Father Christmas. Never tell them an untruth such as "the policeman will come and fetch you," or "angels bring babies."

3. Never say when they are naughty "I'll tell your mother." They ought to realize that I will be told as a matter of course. It is apt to make children deceitful.

4. Before stepping off the curb into the street, or stepping on to a carriage way in the park, or when a motor vehicle comes in sight on a country road, I make Pauline hold my arm and I hold Molly's hand. You should do the same. On the pavement make them walk beside you, do not let them straggle all over the pavement. Never take them under any roof without my knowledge. No one else must be in charge of them for one moment without my permission, except their father, you or me.

5. Do not think it necessary to amuse them the *whole* time. They are accustomed to amuse themselves. This is a good thing for them. By this I do not mean you should not play with them when you feel so inclined.

6. Strangers take a great deal of notice of them and I am anxious that they should not grow up thinking themselves of more importance than any other member of the general public.

General Health Notes. I must be told everything, however trivial it is, about their health, conduct or funny remarks. When you notice a symptom of ill health, however small, let me know at once, whether it is in the middle of the night or whether I am at a dinner party. When you cannot speak to me or telephone to me put the child to bed, send me a telegram and send for the doctor. Money where health is concerned is no object. This also applies to yours. If your suspicions prove to be unfounded, it would only give me more confidence in you. If they complain of any pain always conclude they really have one until both you and I agree that they have not.

Both children must go to the W. C. every morning after breakfast regardless of whether they want to or not. If a whole day goes by without the bowels moving inform me and give an aperient. You need not inform me by telegram if they miss one day, but you should if they miss two. They should be made to go to the W. C. to make water whether they want to or not at the following hours: first thing in the morning, before luncheon, when they come in in the afternoon, and at bed time.

All wet clothes, especially wet shoes and socks (this includes faintly damp) should be changed at once on coming into the house, and if they are damp they should not sit down out of doors. They should never sit on anything damp or on cold stones. It is no good asking them if they are cold or hot. You can really only

tell by feeling them or the look of them. At home we always have an outside thermometer and you should get into the habit of consulting this when deciding what out-door clothes they should wear.

They must never eat anything, including chocolates or sweets, between meals. They know that they must tell people who offer them anything to eat that "mother doesn't let me."

It does not matter if they drink out of each other's glasses or use each other's cutlery but they must never use a glass, etc., used by somebody else before it has been washed.

You may have to limit the amount they eat of any particular thing but never press them to eat against their will. Give them small helpings so that they do not get into the habit of wasting food by leaving it on their plates. Let them drink as much water as they like at any time.

Unless their father or I am present you are completely responsible to me for them without any exception, and I will always back you up.

PFEIFFER'S BACILLUS IN INFLUENZA (Lancet, London, Oct. 4, 1919). The investigation made by Wilson comprises the examination of forty-three separate specimens of blood. Ten of the specimens were from cases that were definitely not influenza, but included such conditions as vaccinia, mumps, bronchitis, etc. In all of these no agglutinins for the *B. Influenzae* were found. The remaining thirty-three cases were typical examples of influenza of a severe type and all of the patients were suffering from or were convalescing from bronchopneumonia at the date of the examination. Of the thirty-three the blood serum of eleven showed distinctly the presence of agglutinins for Pfeiffer's bacillus. The important point was that the positive cases still manifested elevation of temperature, while those that were negative had been afebrile for periods varying from six to thirty-two days. The study of three cases showed that the agglutinins very rapidly disappear from the blood when the patient becomes convalescent.—*Journal A. M. A.*

DEPARTMENT OF ABSTRACTS

BRUCE, W.: A SIMPLE METHOD FOR DETERMINING THE REACTION OF FECES. (*Journal of Laboratory and Clinical Medicine*. October, 1919, p. 61.)

The author suggests the following method for testing the reaction of feces: Prepare 1 per cent. aqueous solution of alizarine. Place 2 small drops of the indicator on a glass slide one inch apart. Dip a glass stirring rod into the liquid part of the specimen or puncture the mass if formed. Mix thoroughly in one of the drops using the other as a control. An alkaline reaction is indicated by a reddish violet to violet color, neutral no change, and acid to a light yellow color. The density of these colors will depend on the amount of acid or alkali present. The use of white porcelain is recommended.

The indicator can also be used for urine and human milk. Although some biochemists and physiologists state that the reaction of feces has little value, the author believes a great deal of this feeling is due to the present unsatisfactory methods of obtaining it.

A. BRET RATNER.

HERRICK, W. W. AND DANNENBERG, A. M.: OBSERVATIONS ON THE CEREBROSPINAL FLUID OF ACUTE DISEASE. (*Journal of the American Medical Association*, November, 1919, p. 1321.)

The authors state that a review of the literature and a personal study of 76 cases not resulting in meningitis show beyond question that the cerebrospinal fluid often gives evidence in increased pressure, pleocytosis and heightened globulin content of a reaction on the part of the leptomeninges to the infective agents or toxins of a large number of miscellaneous acute diseases not ordinarily causing true meningitis.

These diseases are lobar pneumonia and bronchopneumonia, influenza, tonsillitis, the exanthems, herpes zoster, parotitis, typhoid fever sepsis, arthritis, pleurisy-migraine, reaction to typhoid inoculation and others. Most but by no means all of the patients with subarachnoid reaction have clinical meningismus.

The greatest caution should be used in making a diagnosis of meningitis or poliomyelitis from fever, meningism and the changes in the cerebrospinal fluid mentioned. Cases with less than 100

cells should be viewed with skepticism unless clinical, epidemiological or other laboratory evidence is decisive.

The meningococcus finds access to the subarachnoid space in 95 per cent. of meningococcus septicemias—25 per cent. of pneumonia cases. The *T. B.* and *spirocheta pallida* also readily pass the meningeal-choroidal barriers, less readily the *bacillus typhosis*, influenza and gonococcus. *Staphylococcus* and *streptococcus* rarely penetrate the subarachnoid system except by direct extension from some focus of suppuration adjacent to the meninges. The agent of poliomyelitis penetrates the structures with great facility.

After an experience of 5000 lumbar punctures in all sorts of conditions, the authors think it absolutely a safe procedure.

A. BRET RATNER.

COHEN, M. B.: THE CHOICE OF SERA IN THE TREATMENT OF MENINGOCOCCUS SEPSIS. (*Journal of Laboratory and Clinical Medicine*, December, 1919, p. 176.)

The author reminds us that a number of observers have noticed variations in the therapeutic result following the use of different sera for the treatment of meningococcus meningitis. Studies by the Royal Army Medical Corps in England, the Pasteur Institute in France, and the Rockefeller Institute in the United States have shown that the group of meningococcus is a heterogeneous one and divided at least into 4 groups. The various commercial polyvalent antimeningococcic sera are made from a number of strains of meningococcus isolated from the spinal fluids of cases of meningitis, and are supposed to contain immune bodies for the 4 main groups. In spite of the polyvalency of the sera, many cases have not responded properly to serum treatment. Clinicians have been in the habit of changing sera when proper results did not obtain and frequently with clinical improvement.

Now that we can grow the organism on suitably enriched media in 24 hours the following should be practiced. When a patient is brought in the meningitis ward, a lumbar tap is done, the fluid sent down to the laboratory and a preliminary bacteriological report is made. Serum is injected and the following day a saline suspension of the patient's organism is tested against vari-

ous dilutions of the different sera. The serum giving the highest titer is then used for the further treatment. This is practical and insures proper treatment.

A. BRET RATNER.

PUTNAM, TRACY JACKSON: THE CALORIE AS A UNIT IN FIGURING MILK MODIFICATIONS. (*The Boston Medical and Surgical Journal*, January 29, 1920, p. 107.)

In concluding the author states:—

1. The method of calculating milk modifications according to the absolute caloric values of the respective food elements is as rational as the present methods of percentage composition and volume, or by total caloric value.

2. The use of the calorie as a unit in expressing the composition of milks is of advantage, in that all food elements are reduced to a common standard.

3. Such a view of the infants diet might lead to a clearer comprehension of the subject by some practitioners.

4. It would allow an easy manipulation of the fluid volume apart from the food value of various mixtures; and might lead to the accumulation of more data concerning the effects of alterations in fluid volume.

5. It would facilitate the extension of the calculation of the diet into late infancy, when desirable.

6. The calculation of modifications would be simpler in many ways, and more easily understood, than under many of the present systems. Alterations of one constituent without changing the others would be particularly simplified.

7. But the possible advantages gained by such a method of calculation are probably scarcely sufficient to warrant its adoption in place of the present well-tried and well-known procedures.

L. L. SHAPIRO.

GUERBET, M.: LEAD POISONING FROM NURSING BOTTLES. (*La Nourrisson*, June, 1918.)

Tests for the presence of lead were made on milk pasteurized for 20 minutes in nursing bottles with the result that the milk was found in some cases to contain as much as 9 mmg. of lead to the litre. The milk assumed a yellowish tint. The author offers the explanation that alkalies or chlorides combined with

heat during the pasteurization may attack the glass. Minute quantities of lead would be thus set free and changed into sulphide.

C. D. MARTINETTI.

KIRMISSON, E.: EPITHELIOMA OF APPENDIX IN A CHILD. (*Bulletin de la Societé de Chirurgie*, July 3, 1917.)

An emergency appendix operation was done on a girl of 14. Peritonitis had set in from a long ulcerated appendix. The appendix contained no fecal matter nor foreign body but at its extremity was a yellowish mass of the size of a cherry. This had formed in the mucus and had not invaded the muscular tissue. Microscopic examination disclosed its nature to be an epithelioma of the mucus. Recovery was uneventful and the girl after two years was still in perfect health.

C. D. MARTINETTI.

WALLACE, J. SIM: SALIVA AND ORAL HYGIENE. (*The Medical Press*, June 18, 1919, p. 469.)

The author combats the theory that the saliva is primarily a digestive juice. He says it is generally accepted that the digestion of uncooked starches by the ptyalin in human saliva is almost negligible and further states that it has not even been contended that it digests sugar, although the ingestion of sugar stimulates a fairly strong flow of ptyalin-rich saliva. He points out how strange it is that almost immediately after the food is mixed with ptyalin it is sent on to an acid medium where the digestion of starch by ptyalin is immediately arrested. It seems ridiculous to him to try to argue further for this digestive action of saliva by stating that the food is in bolus form in the stomach and not disintegrated for some time, thus permitting the action of the thoroughly mixed saliva to go on more nearly to completion. He does not believe food enters the stomach in one big bolus, but is at once rather intimately mixed with the gastric juices as it enters the stomach.

The author believes that one of the functions of the saliva, which becomes markedly alkaline when food is taken, is to remove the food particles from the mouth. An alkali separates adhering mucus and clears away all the food connected with it.

Also an acid reaction would tend to decalcify the teeth. Sugar taken into the mouth favors this acid reaction, but it also stimulates the free flow of the alkaline saliva which neutralizes the acid and preserves the teeth. Another duty of saliva is to provide ameboid phagocytic cells—the so-called salivary corpuscles which may be regarded as the scavengers of the mouth.

Thus he believes that it is much more accurate to consider the prime function of saliva as one of oral hygiene than one of carbohydrate digestion.

HUGH CHAPLIN.

PELFORT, C.: TUBERCULAR MENINGITIS IN INFANCY. (*Archivos Latinos Americanos de Pediatria*, Nos. 1 and 2, 1917.)

This paper, read before the Pediatric Association of Montevideo, was based on the study of 20 cases under 2 years belonging to the Clinic of Prof. Morquio. The following conclusions were reached:

1. Tubercular meningitis in infants is rather frequent and is observed chiefly in the male sex (14 cases out of 20).
2. Clinically the disease appears of primary origin, but the autopsy invariably shows it to be secondary, the first lesions being in the peri-tracheal bronchial ganglia.
3. Infection occurs usually from relatives.
4. Cold weather predisposes to infection. Practically all the cases observed occurred in winter or spring.
5. Symptoms vary and progress of the disease is insidious.
6. The commonest forms are those associated with somnolence and convulsions.
7. Spinal rigidity and Kernig's sign are constant.
8. Lumbar puncture confirms diagnosis.
9. Death occurs in 100 per cent of cases.

C. D. MARTINETTI.

HATFIELD, HUGH K.: A PRELIMINARY STUDY OF THE EFFECT OF RICKETS ON THE JAWS. (*The International Journal of Orthodontia and Oral Surgery*, July, 1919, p. 367.)

The article includes, first, an outline of some of the characteristic features of the disease seen in other parts of the body; second, a reference to observations upon its deforming action upon the jaws; and lastly, photographs showing models of the

teeth and jaws of the group of rachitic children under observation.

Concerning the second portion of the article the following orthodontic conception of the disease is given: Rickets, characterized by a faulty development of bone, is a very important etiologic factor and deforming agent in malocclusions. It delays the eruption of the deciduous teeth which are in turn lost early with resulting malocclusion in the second dentition. There is faulty development of the alveolar process and of the bones of the mandible and maxilla. The marginal ridges of process are thickened and rounded. Incisors of the upper jaw usually small, soft and friable. Permanent teeth damaged before their appearance, showing erosions on body and cutting edge. The upper jaw narrowed or V-shaped in form. Palate high vaulted and teeth crowded. Lower jaw shortened or trapezoid in form. Upper alveolar processes have a tendency to turn out; lower alveolar processes, to turn in. Of these signs the narrow or V-shaped upper arch with high vaulted arch palate seems to take first place as a characteristic deformity of rickets.

The author draws no definite conclusions from his studies, as they are not completed, but ventures the interesting speculation that as the disease seems to be essentially an epiphyseal disturbance of the bones and as the growth of the mandibles is not of an epiphyseal character, the prognosis in these cases would seem to be more favorable than in the case of long bones with epiphyses.

HUGH CHAPLIN.

SCOTT, A. J., JR.: BOILED VS. RAW MILK IN INFANT FEEDING. (*Southern California Practitioner*, February, 1920, p. 11.)

Very young infants, according to the author, do better, gain faster, and have fewer digestive disturbances upon the use of boiled than raw cow's milk, for the following reasons:

1. Raw milk forms tough, leathery, large curds in the stomach, many of which pass, not completely digested, through the stomach and intestines and are found in the stools.
2. Boiled milk forms soft flocculent curds, and the stool is softer and smoother.
3. Raw milk curds take more calories of heat from the child

to digest than boiled milk, because the latter curds are smaller and softer.

4. Raw milk fat forms large soap stools, the curds of which are like lima beans, while the heating of the milk causes chemical changes in the fat and while a considerable amount is passed by the stools as evidenced by the smooth oily appearance, only in exceptional cases do we find the bean like masses.

To prevent the child developing scurvy or rickets when feeding a cooked milk, one which has all the vitamins destroyed, use some fresh fruit juice, preferably orange, which may be given to infants as young as one month without untoward effects.

L. L. SHAPIRO.

UNGER, LESTER J.: THE THERAPEUTIC ASPECT OF BLOOD TRANSFUSION. (*Journal of the American Medical Association*, September 13, 1919, p. 815.)

Unger in his article discusses the 2 methods of transfusion, the dosage and indications. He then summarizes as follows:— There is a far greater number of reactions following transfusions with citrated blood than with unmodified blood. This is due to alterations in the blood cells. The platelets undergo early coagulative changes. Sodium citrate acting as a harmful foreign substance renders the red cell more fragile and more easily hemolyzed. This undesirable result is of especial importance in hemolytic diseases. Transfusion of whole unmodified blood is the procedure of choice when blood is required as a tissue. When it is wanted merely to replenish an impoverished circulation with an adequate supply, citrated blood may serve as a substitute. For the selection of donors, a simplified and rapid microscopic method is desirable. Repeated withdrawal of blood for transfusion may produce in the donor an intense secondary anemia with an increase in the leucocyte count. The onset of hypertransfusion is evidenced by the patient's giving vent to short, sharp coughs. This signal has been of decided value as a warning of impending danger. The giving of more than about 200 c.c. of blood after the occurrence of "the signal cough" may prove fatal. Transfusion yields moderately good results in infections and debilitating conditions. The best results are obtained in toxemias, in shock, in cases of hemorrhage, and in diseases of the blood, in which it is frequently of life saving value.

C. A. LANG.

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ORIGINAL COMMUNICATIONS

EPIDEMIC OR LETHARGIC ENCEPHALITIS IN CHILDREN*

By JOSEPHINE B. NEAL, M. D.

New York

The present outbreak of epidemic or lethargic encephalitis seems to have started in Vienna in the winter of 1916-1917. In the spring of 1918, it appeared in England and France and in the fall of 1918, in the United States. A large number of articles have appeared, to which it is unnecessary to refer at this time. Anyone desiring a very complete bibliography of the present epidemic, as well as of earlier outbreaks, will find it in the article by Barker, Cross and Irwin in the American Journal of the Medical Sciences, February and March, 1920. This study in-

* Read before the Brooklyn Pediatric Society, March 31, 1920.

* From the Meningitis Division, Research Laboratory, Department of Health, New York City.

cludes also a very comprehensive and detailed discussion of several typical cases of encephalitis.

In only a few instances has the subject of encephalitis in children been especially discussed, probably because the disease seems to be one of adult life rather than of childhood. Batten and Still reported 4 cases in 1918 under the heading of "Epidemic Stupor in Children." Netter described cases in Paris giving headache and lethargy as the prominent symptoms. Comby, in 1919, reviewed the literature referring especially to the disease in children, and Heiman, in 1919, described several cases calling the condition, "Post Influenzal Encephalitis." Tilney and Riley, in a study of encephalitis in 1918, reported several cases in children and mentioned 4 or 5 infants which they had seen at the Babies' Hospital.

The fact that the meningitis division has seen a relatively large number of children is due, I think, more to the distribution of our work than to the age distribution of the disease. Moreover, more cases may escape diagnosis in children than in adults, since, as will be mentioned later, the disease is likely to run a milder course in early life. Therefore, in places where lumbar puncture is not freely resorted to for diagnosis, these cases may easily be unrecognized. Of 54 cases studied by Netter, 77 per cent. were more than 15 years of age and in London 86 per cent. of the cases were more than 10 years of age. We have seen approximately 125 cases and of these 58 were 15 years or under.

It seems to me unfortunate that there is a tendency at present to call encephalitis by a variety of names. Such a multiplicity of terms can only add confusion to the general practitioner, who will probably see but few cases of this disease and who should not be asked to burden his mind with several names. It also seems to me unnecessary to attempt to classify the condition too minutely. When we remember that we have an agent that may attack any one or several parts of the central nervous system and in varying degrees of severity, it is obvious that we shall have symptoms of the greatest variety, both in kind and intensity. The study of a large number of cases impresses one more and more with the protean manifestations of this interesting disease.

Some writers, especially McNalty, make a point of prodromal symptoms but inasmuch as they are usually a milder form of the

later symptoms and since, as he himself admits, it is difficult to tell when the prodromal period leaves off and the real disease begins, it seems superfluous to make such a distinction. The characteristic picture in either adults or children is usually as follows: A gradual onset; marked lethargy and asthenia; headache; low, irregular temperature; frequently cranial nerve palsies. Other paralyzes may occur. A mask-like expression is often present. The onset may be sudden and is so more frequently in children than in adults. Other striking features that may be present are catatonia, marked tremors, choreiform movements, profuse sweating, insomnia, delirium, a marked twitching of certain groups of muscles. A slurring, hesitating speech, with a very slow response is quite characteristic. One asks the patient a question. There is a long pause. Finally, after one has become certain that the patient has not heard or will not respond, he answers correctly in a low monotonous voice. Disturbances of vision, either diplopia or blurring are fairly common, and are very diagnostic symptoms. These occur or are elicited more frequently in adults than in children. We have found these disturbances of vision in a much larger percentage of cases in the last few months than in the preceding year. Whether they have really been present in greater numbers or whether we have elicited them more carefully, I do not know. However, I read with interest that Netter has found such disturbances less frequently this winter than last so it seems that their occurrence does vary at different periods. Captain Smith of the Public Health Service told me that in New Orleans, where a considerable number of cases occurred in the winter of 1918-19, the oculists saw a surprising large number of cases of transient diplopia, or strabismus occurring without other symptoms. Vomiting is common especially in children. Constipation, rather than diarrhea, is the rule. At Mount Sinai Hospital, it is reported that a considerable number of cases show retention of urine. This has been present in only a small percentage of our cases. An interesting point has been demonstrated in the First Medical Division at Bellevue by Dr. Norrie and Dr. Cotter, who have shown that the oculo-cardiac reflex has been present to a marked degree in practically all the cases that have occurred on the division. This reflex, one will

remember, is brought out by pressing the eyeballs and shows itself by a marked slowing of the pulse.

The course of the disease is often remarkable for the sudden, transient changes in the condition of the patient, either for the better or worse. These changes show themselves most in the mental condition and are often very temporary so that one must be guarded in making a prognosis until he has studied the case for a time and gained some idea of the patient's average condition.

The most striking feature of the disease, especially in adults, is the prolonged course. Cases will run 2, 3 or even 4 months with so light changes from week to week (disregarding the temporary changes to which I referred) that they are the despair of the physician as well as of the family. Many seen at the height of the disease appear so desperately ill that one who is not fairly familiar with such conditions would be quite hopeless as to the ultimate outcome. These prolonged cases are very unusual in children. In only 1 instance have I observed it. That case will be discussed in detail later. The average duration in children is under 6 weeks. The onset, as I said before, is more frequently sudden; there are fewer paralyses, and fewer disturbances of vision. Table I shows the salient features in the 58 cases that I have studied. An interesting point is the sex distinction. Of the 58 cases, on which this study is based, 44 were boys and 14 girls.

DIFFERENTIAL DIAGNOSIS: A differential diagnosis in children must be made from tuberculous meningitis, brain tumor, meningism with some unknown underlying cause, syphilitic involvement of the central nervous system, and poliomyelitis or polioencephalitis and meningitis. In adults, especially, cerebral hemorrhage or thrombosis and uremia must be considered.

The diagnosis from tuberculous meningitis is by no means easy in the more typical cases. After studying a number of these cases one may hazard a guess from the clinical picture judging by the patient not seeming so ill as a case of tuberculous meningitis would be, assuming that it is a case of 2 or 3 weeks' standing; vomiting is a less constant feature, and the pulse is more likely to be regular in encephalitis than in tuberculous meningitis. The final diagnosis will rest on the examination of the spinal fluid and even here the first examination may leave us in doubt. The

spinal fluid findings in encephalitis are discussed under laboratory findings and are not given at this point.

Therefore, if the case is seen early, we may, even with the examination of the spinal fluid, be in doubt as to the diagnosis and must await the further development of the case and the examination of the fluid at a later stage.

Brain tumor is comparatively rare in children and usually shows a more protracted course than does encephalitis. Choked disc, which occurs in brain tumor, does not occur in encephalitis, though some edema may be present. The spinal fluid findings are not constant in brain tumor, sometimes showing an increase in cells, though rarely an increase in albumin and globulin, so that it will not be of great help in making the diagnosis. Brain tumor is more often a stumbling block in the diagnosis in adults. Several cases which had been diagnosed as encephalitis at Bellevue proved on autopsy to be brain tumor.

Meningism, in mild cases, is sometimes suspected, occurring perhaps with the gastrointestinal upset that sometimes accompanies encephalitis, but this will be ruled out by the normal fluid found in meningism. Certain cases of meningism, to be sure, do not show a perfectly normal fluid but may show an increase in the proteid content or cells or both. These cases usually fall into 4 well-defined groups: cases with severe and prolonged convulsions as the convulsive type of whooping-cough; cases in which the meningism has been persisting for a long time without relief of pressure, especially in cases that are moribund when seen; cases with an inflammation near the meninges as otitis media, mastoid or sinus involvement, called by Strauss "meningitis sympathetica"; and a miscellaneous group of special conditions—mumps, typhus, etc. I feel strongly that when changes are found in the spinal fluid one must search carefully for some such underlying cause as those mentioned above before one assumes that it is a simple case of meningism.

Syphilis of the central nervous system is less common in children than in adults and, therefore, is seldom a problem in differential diagnosis. For sometime we have been doing as routine a Wassermann of all our clear spinal fluids showing pathological changes and we assume that a negative Wassermann rules out a syphilitic condition of the central nervous system. The differen-

TABLE I.—SALIENT FEATURES OF FIFTY-EIGHT CASES OF LETHARGIC ENCEPHALITIS.

Case No.	Age	History of Influenza	Type of Onset	Lethargy	Asthenia	Headache	Palsies	Reflexes	Temperature	Vomiting	Disturbance of Vision	Miscellaneous	Duration	Outcome
14	3 mo. M	+	Slow	Slight	+	?	.....	—	100	+	.....	.....	?	Recovered
36	4 mo. M	—	Sudden	++	+	?	Neck, Musc.	—	101	—	.....	.....	1 week	Recovered
262	7 mo. M	—	Sudden	++	+	.....	.....	—	Nor	—	.....	.....	2 weeks	Cured
388	8 mo. M	+	Slow	+	+	.....	.....	—	102	—	.....	.....	7 days	Died
368	9 mo. F	+	Sudden	++	+	.....	Int. strabis	—	To 105	—	.....	.....	2 weeks	Recovered
14	14 mo. M	+	Slow	++	+	?	.....	?	104	—	.....	.....	1 week	Cured
32	15 mo. M	+	Slow	++	+	?	.....	—	Slight	+	.....	Mask-like expression, spasticity, marked tremors, convulsions just before death, marked arrhythmia	3 weeks	Died
5	15 mo. M	+	Slow	++	+	.....	.....	?	Mod.	+	.....	.....	4-5 weeks	Recovered
371	18 mo. F	+	Slow	++	trans.	?	Int. strabis	N	102-103	+	.....	.....	1 week	Died
20	20 mo. F	+	Slow	+	—	?	rt. facial	N	Slight	+	.....	.....	3 months	Died
323	20 mo. F	—	Slow	+	—	.....	Spastic condition of rt. arms and leg. Both sides of face alternating	N	100	+	.....	.....	5-6 weeks	Cured
102	21 mo. M	—	Slow	+	—	?	.....	.....	98.6	—	.....	Spasticity and facial paralysis	3 weeks	Cured
94	2 yr. M	++	Slow	++	+	.....	.....	R7L	101	+	.....	.....	10 days	Recovered
49	2 yr. M	++	Slow	++	?	.....	.....	N	104	—	.....	Rotating of eyeballs, twisting of lips, difficult respiration, convulsions, arrhythmia	6 days	Died
93	2 yr. M	—	Sudden	++	+	—	.....	N	105.2	+	Dilated L7R slug reac.	Twitching, head, tongue, face	3 weeks	Died
54	3 yr. M	+	Sudden	+	+	+	.....	—	104	+	.....	.....	4 weeks	Recovered
16	3 yr. M	+	Slow	++	+	+	.....	—	Slight	—	.....	.....	3 weeks	Recovered
280	3 yr. F	+	Sudden	++	+	—	legs weak rt. facial	—	N	—	.....	.....	?	Cured
87	3½ yr. M	—	Sudden	+	+	+	.....	—	100	+	.....	.....	10 days	Recovered
351	4 yr. F	Probable	Sudden	+	+	+	.....	—	Slight	+	.....	.....	less than 1 month	Recovered
137	4 yr. M	—	Sudden	+	+	+	.....	rt. ff. n	Slight	+	.....	.....	1 month	Recovered
198	4 yr. M	—	Slow	++	+	+	.....	—	100-1	+	.....	.....	2 weeks	Recovered
281	4 yr. M	—	Sudden	++	+	+	Prosis rt. eyelid	—	100-102	+	.....	Babinski	2 weeks	Died
240	5 yr. F	—	Slow	++	+	+	.....	—	100.5	+	.....	.....	3 weeks	Cured
295	5 yr. M	—	Slow	++	+	—	.....	N	98.2	—	.....	.....	2½ weeks	Cured
304	6 yr. M	+	Sudden	+	+	+	.....	N	N	+	.....	.....	11 days	Cured
391	6½ yr. F	+	Slow	+	+	+	Strabismus	N	100.5	+	.....	.....	2 weeks	Recovered
395	7 yr. F	+	Slow	++	+	+	.....	N	101.5	+	.....	.....	23 weeks	Recovered
19	7 yr. M	+	?	++	+	+	.....	N	104	—	.....	.....	3 weeks	Died
41	7 yr. M	+	Slow	++	+	+	.....	N	104	—	.....	Spasticity of legs, vacant expression	4 weeks	Recovered
80	9 yr. M	—	Sudden	+	+	+	.....	N	Slight	—	.....	Babinski	2 weeks	Recovered

TABLE I.—(Continued)—SALIENT FEATURES OF FIFTY-EIGHT CASES OF LETHARGIC ENCEPHALITIS.

NEAL: *Lethargic Encephalitis in Children*

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Case No.	Age	History of Influenza	Type of Onset	Lethargy	Asthenia	Headache	Palsies	Reflexes	Temperature	Vomiting	Distance of Vision	Miscellaneous	Duration	Outcome
254	7 yr. F.	—	Slow	++	++	+	Sl. rt. facial	N	Irreg.	—	Fess. of diplopia eyelids closed	1 convulsion	3 weeks	Recovered
55	7 yr. M.	—	?	++	+	—	.....	—	104	—	.....	.....	9 days	Recovered
12	8 yr. F.	—	Sudden	+++	+++	+++	.....	—	?	+	—	Twitchings	10 days	Died
16	8 yr. M.	—	Slow	+++	+++	+++	.....	—	N	?	R7L contr react	Twitchings, Babinski	33 days	Died
40	8 yr. M.	—	Sudden	+++	+++	+++	.....	?	?	?	sl.	.....	5-6 weeks	Recovered
66	8 yr. F.	—	Slow	+	+	++	.....	?	102	—	.....	Movements of left arm, diplopia, spasm of abd. musc., choreiform mac.	1 month	Recovered
65	8½ yr. M.	—	Slow	+++	+++	+++	.....	—	99	++	Dilated	Slowness of speech	1 month	Recovered
357	9 yr. M.	+	Slow	+++	+++	++	.....	—	104	++	.....	.....	1 month	Recovered
46	9 yr. M.	—	Slow	+++	+++	++	Facial sl. dysphagia	.....	?	—	.....	Babinski, mask-like expression, tremors at times, arrhythmia	3 months	Recovered semi
105	9 yr. M.	—	Slow	+	+	+	Int. Strab.	?	?	—	.....	.....	1 week	Cured
35	10 yr. M.	+	Sudden	+++	+++	+++	.....	N	Slight	++	.....	Convulsions	2 weeks	Recovering
100	10 yr. M.	+	Slow	+++	+++	+++	.....	N	99	—	Contr.	Babinski, pupils unequal. Twitchings, chiefly left.	7-8 days	Died
42	10 yr. M.	+	Slow	+++	+++	+++	.....	N	102	—	Photo-phobia	Twitchings of musc. esp. face, Babinski rt. slowness of speech—retention of urine	16 days	Died
70	10 yr. M.	—	Sudden	+	+	+	.....	D	101	—	.....	Delirious during convalescence, arrhythmia at times	1 week	Cured
38	11 yr. M.	+	Slow	+	+	+	Rt. facial old left hemiplegia	—	101	+	.....	Delirium at first. Convulsive movements eyes	2 months	Recovered
332	11 yr. M.	—	Sudden	+	+	+	.....	—	101	—	.....	Trembling. Choreiform movement of rt. arm and leg	?	Recovered
78	12 yr. M.	—	Sudden	+	+	+	.....	—	99	—	.....	.....	6 weeks	Recovered
327	12 yr. M.	—	Slow	+	+	+	Sl. rt. facial	D	100-103	—	Dip. imp. vis.	Twitchings	6-8 weeks	Recovered
245	12 yr. M.	—	Slow	+	+	+	.....	—	99.6	++	.....	Retention of urine	4 months	Recovered
187	13 yr. M.	—	Slow	+	+	+	.....	—	99.	++	.....	.....	3 weeks	Recovered
317	14 yr. M.	ago	Sudden	+	+	+	.....	—	100-103	—	.....	Slowness of Speech	6 weeks	Recovered
22	14 yr. F.	—	Slow	+	+	+	old left hemiplegia	—	96	—	.....	Tremors, sweating, catatonny insomnia	3-4 weeks	Recovered
69	14 yr. M.	—	Sudden	+	+	+	.....	N	101-2	—	Diplopia	Delirium early. Pains in region of sciatic	6 weeks	Recovered
81	14 yr. M.	—	Slow	+	+	+	.....	N	+	—	Diplopia	Delirium	6 weeks	Recovered
331	14 yr. M.	?	Sudden	+	+	+	.....	N	102	+	.....	Coma 10 days	3 weeks	Recovered
83	15 yr. F.	.....	Slow	+	+	+	.....	N	101	+	Diplopia	.....	2 weeks	Died
77	15 yr. M.	—	Slow	+	+	+	.....	Dim.	102	—	Diplopia	.....	3-4 weeks	Recovered

tial diagnosis from the encephalitic form of poliomyelitis is, in certain mild cases, quite impossible, I believe. Since at the present time we are having so few typical cases of poliomyelitis and since, even in the epidemic of 1916, we saw very few of the encephalitic type, it seems more logical to consider these cases encephalitis though I am perfectly free to confess that had they occurred in the summer of 1916 I should have diagnosed a small number of them as the encephalitic form of poliomyelitis. Probably neutralization tests are the only method of making diagnosis and these tests are not always satisfactory.

The diagnosis from the various forms of acute purulent meningitis is usually not difficult though certain cases of encephalitis, with an acute onset, have been considered cases of epidemic meningitis. The clinical symptoms in atypical cases may be sufficiently similar to cause confusion. The examination of the spinal fluid affords the most reliable means of differentiation, the spinal fluid of purulent meningitis being of varying degrees of cloudiness and showing an excess of polymorphonuclears, a diminished or absent Fehling's, and the causative organisms.

The diagnosis from cerebral thrombosis or embolism may not be easy, as sometimes a monoplegia or a hemiplegia may be present in encephalitis and of course, cases with cerebral hemorrhage or embolism usually show drowsiness and a slowness of response. This diagnosis, as well as that from uremia, must, of course, be made chiefly in adults.

A description of certain cases may be of interest.

CASE 1. L. S., a boy of 9 years, is of interest on account of the long duration of his disease. He was admitted to Willard Parker Hospital on February 13, 1919, with a history of being ill for 3 days and a diagnosis of epidemic meningitis. He was then comatose, had a slight rigidity of the neck and Kernig's sign, exaggerated knee jerks, positive Brudzinski sign, and Babinski reflex. He ran an irregular temperature from 100° to 103° F. until February 19, after which it was below 100° F. until March 14. At times his pulse and respiration were irregular. He became progressively worse and by February 20 had rigidity of the entire body, and a mask-like, expressionless face. He became unable or unwilling to swallow and had to be tube-fed. The white blood count was 15,000 of which 81 per cent. were poly-

morphonuclears. The first lumbar puncture, February 13, showed a clear fluid with moderate increase in cells, 60 per cent. polymorphonuclears, moderate increase in protein elements, normal reduction of Fehling's and a negative Wassermann test. Fluid withdrawn February 14, was slightly blood-tinged so that it had a somewhat hazy appearance. Therefore, with the clinical picture resembling meningitis so strongly, and an excess of polymorphonuclears in the first fluid, serum was given. Of course, this obscured the spinal fluid picture for some time. During all this time the child did not speak and has not up to the present time. There were frequent muscular twitchings. Early in March, he began to move his head and a little later his legs and arms, and seemed to be progressing toward recovery. On March 14, however, the temperature rose to 106° F., he perspired profusely and seemed to be in a desperate condition. A blood culture at this time was negative. Twenty c.c. of spinal fluid were withdrawn under some pressure, showing a moderate increase in cells, 80 per cent. mononuclears, increase in albumin and globulin, and a normal reduction of Fehling's. On March 15, he began to improve, his temperature dropped to 100° F., after that time his condition showed some progressive improvement, and he gained in weight. A peculiar hairiness appeared on the trunk, legs and arms and forehead. He looked about and had an intelligent expression but did not respond in any way when spoken to. He had to be tube-fed up to January, 1920, but was able to swallow if one was dexterous enough to insert food when his mouth was open. His arms, and especially his legs, were somewhat spastic and the right leg showed contracture, though it was possible nearly to straighten it without his evidencing much discomfort.

He was transferred to the Children's Medical Service at Bellevue Hospital in December, 1919, where he improved somewhat under the administration of thyroid extract. After remaining there for 2 or 3 months his parents insisted on his removal. This case is of interest on account of its severity, its long duration and the seriousness of the sequellae.

CASE 2. E. M., a girl of 14 years. Seen January 16, 1920. Her parents stated that 4 or 5 years before she had suddenly developed a paralysis of the left arm and leg, which had practically cleared up. So far as could be ascertained this occurred dur-

ing the epidemic of poliomyelitis in 1916 and was probably an attack of poliomyelitis. Her present illness began rather slowly on January 12, apathy, tremors, and a subnormal temperature 96° F., being the chief symptoms. She had grown progressively worse and when examined, January 16, had the appearance of being in a very serious condition. Her temperature was still 96° F., she was sweating profusely, catatonia had developed, and there were marked tremors. She was extremely apathetic and apparently in a semi-stuporous condition, but she answered questions correctly, though very slowly and in a monotonous voice. Her neck was moderately stiff, and there was a question as to the Kernig, since there was a general hypertonicity of the muscles. The knee jerks were equal and exaggerated. The pupils were equal and responded to light. There was no paralysis or disturbance of vision. A lumbar puncture revealed clear fluid, under increased pressure.

For about a week following the temperature was elevated. She had a rigid neck and suffered from insomnia. She then slept for about 17 hours and after that began to improve rapidly. She was seen about 2 months later, at which time she was perfectly recovered, with no sequellae.

CASE 3. A boy of 12 years. Past history negative. Examined December 19. Present illness began December 14 suddenly with headache. Diplopia and impaired vision soon developed. When examined the pupils were equal and reacted to light—the reflexes were sluggish but equal, there was stiffness of the neck and a moderate Kernig. The pulse was regular and around 100, and the range of temperature was from 103° to 100° F. There was a slight facial paralysis and a double ptosis, more marked on the right side. There were muscular twitchings, especially of the extremities. The diplopia and impaired vision persisted. A provisional diagnosis of tuberculous meningitis had been made by the doctor in attendance. The case gradually cleared up but the diplopia returned at times for 3 to 4 months and it was reported in April that his mentality was slower than before the illness.

It will be interesting to follow up these cases several months or a year after the illness to determine whether any permanent defects result from the disease. From a limited number of observations it seems that the return to a normal condition is very

slow in certain instances. One man who suffered from a very severe form of the disease was reported after more than a year as being quite changed in disposition, being very irritable. He had previously been even-tempered.

Many cases run a much milder course than these first described. In about 25 per cent. of cases death occurs, usually from 1 to 3 weeks from the time of onset.

LABORATORY FINDINGS: The blood picture is not characteristic. It may be normal or may show slight leucocytosis, perhaps up to 15,000. The blood cultures are sterile. The urine is negative or shows the mild degree of nephritis that is common in acute infectious conditions. The examination of the spinal fluid throws more light on the diagnosis than does any other laboratory procedure.

The spinal fluid shows practically the same picture as in poliomyelitis. It is clear and is usually increased in amount. The cells are usually slightly or moderately increased, seldom greatly, perhaps up to 150 or 200. The cell counts may run higher in poliomyelitis; the great majority do not. As in poliomyelitis, there is usually an excess of mononuclears, but an excess of polymorphonuclears may occur. The albumin and globulin are increased in varying degrees, the reduction of Fehling's is normal. The increase in cells and protein content is not always in the same ratio. No organisms are reported by smear or culture by most workers. The gold chlorid curve depends apparently on the amount of albumin and globulin present and duplicate curves may be selected from those in poliomyelitis fluids. In some instances, more often in convalescent or mild cases, the findings may depart little from the normal. This is true also in poliomyelitis. Many reports of encephalitis show that the cell count (which, unfortunately, is often the only information given) falls off very quickly. This has been our experience in most instances. In 2 of our cases of long duration, the character of the fluid did not change materially over a period of several weeks, but the condition of the patients also showed little change. As in poliomyelitis the fluid may in rare instances be slightly blood-tinged, probably indicating a more than usually severe hemorrhagic process. This comparison with poliomyelitis is made not because I believe the 2 diseases are at all identical, but to emphasize the fact that in each instance

the spinal fluid is not specific, but shows the reaction of the meninges to an inflammation of the brain substance. A somewhat similar condition exists in the various syphilitic involvements of the central nervous system, but in these conditions the gold chlorid curve and the Wassermann test are helpful in making the diagnosis.

The most difficult and the most needed diagnosis is that made from the fluid of tuberculous meningitis. While generally the number of cells and the increase in albumin and globulin is greater in the latter disease, it is by no means always so, and it is sometimes necessary to examine more than one fluid before one can be certain of the diagnosis, as it is often difficult to find the tubercle bacillus in early tuberculous meningitis and the reduction of Fehling's may be normal, at that time. The reduction of Fehling's is usually diminished or lost in late cases of tuberculous meningitis. Table II shows the findings in the spinal fluids in our cases of lethargic encephalitis under 15 years of age.

Inoculation of monkeys, with the emulsified brain and cord of fatal cases, has not given conclusive results. Most observers report that they are unsuccessful in reproducing the disease in monkeys.

Strauss, Hirshfield and Loewe, however, report the successful reproduction of a disease which they consider encephalitis both in monkeys and rabbits by using the emulsified brain substance of a fatal case of encephalitis.

PATHOLOGY: Lethargic encephalitis belongs to the class of inflammatory diseases, in which also are included poliomyelitis, syphilitic lesions of the central nervous system and trypanosomiasis. While these different diseases have, broadly speaking, certain characteristics, the cases in a given class differ so widely that it is difficult, if not impossible to accurately diagnose, by a study of the pathology alone, the less typical cases.

The meninges are usually described as showing only slight changes—an increase in the cellular content, particularly in the neighborhood of the blood vessels of the pia-arachnoid. The cerebral cortex is generally normal, except for congestion of the vessel of the leptomeninges. In the brain substance, the changes are most marked in the basal nuclei of the brain, the upper part of the pons and peduncles, the gray matter of the floor of the fourth

ventricle, and the aqueduct of Sylvius. The changes in the medulla and cord are often reported as less pronounced, though observers have noted the same changes occurring in the upper section of the cord. This was certainly observed in the case of an adult which came to necropsy (reported in the International Clinics).

The lesions are generally described as consisting of 4 kinds.

1. Infiltration of the walls of the small vessels with lymphocytes and plasma cells.

2. Foci of interstitial and parenchymatous infiltration with round cells. In this reaction neuroglia cells may take part.

3. Lesions of the nerve cells—usually not so extensive as in poliomyelitis, and with less neuronophagia. These lesions of the cells usually occur when the inflammatory process takes place in the gray matter, but they may develop in the absence of an inflammatory reaction. Such is the case with regard to the cells of Purkinje in the cerebellum where inflammatory changes are almost entirely absent.

4. Foci of perivascular hemorrhage. The vessel walls are usually not necrosed.

In connection with the statement that lesions of the cells may occur in regions where there is no evidence of inflammatory reaction, it is interesting to recall that Abramson, in a very excellent study of the pathology of poliomyelitis made at the Research Laboratory during the epidemic of 1916, brought out the same fact in regard to the lesions of poliomyelitis.

THEORIES: Three theories have been advanced to explain the occurrence of lethargic encephalitis. When it first appeared in England, it was suggested that it was caused by food—botulism or some poison derived from substitutes or solanin accumulating in sprouts of potatoes or other vegetables. This theory has been definitely disproved and discarded. According to a second theory, it is a form of poliomyelitis; and, according to a third, it is connected with the epidemic of influenza.

The theory that it is a form of poliomyelitis has not been definitely proved or disproved. Epidemic poliomyelitis usually occurs in hot weather, the majority of the victims are children, and the lower motor neuron type of paralysis constitutes the great majority of the cases with paralysis. The onset is usually sudden and the greater number of deaths occurs in the first

TABLE II.
LABORATORY FINDINGS IN CASES OF LETHARGIC ENCEPHALITIS.

Case No.	Amount in C. c.	Cytology	Protein	Fehling's Reaction	Animal Inneculation	Wassermann Reaction	Onset to Puncture
14	30	Greatly increased.... Mononuclears 80%	+++	+++	.....	.....	?
36	30	Greatly increased.... Mononuclears	++	+++	.....	.....	1 day
262	15	No increase in cells	+ 1	+++	.....	.....	7 days
388	25	Greatly increased.... Mononuclears 90%	++++	.....	—	.....	3 days
368	15 sl. cloudy	Greatly increased.... Mononuclears 90%	++	+++	.....	.....	3 days
88	5	No increase.....	+ 1	+++	.....	.....	5 days
	60	Greatly increased.... Mononuclears 80%	++ 1	+++	—	—	14 days
	35	Greatly increased.... Mononuclears 80%	+++	+++	.....	.....	15 days
32	30	Slight to moderate in- crease. Monos. 90%	+++	++	.....	.....	16 days
	30	Greatly increased.... Mononuclears 80%	++++	++	.....	.....	18 days
5	10	No increase in cells..	+	+++	.....	.....	3 days
9	30	No increase.....	+ 1	+++	.....	.....	5 days
371	10	Greatly increased.... Mononuclears 80%	++	+++	.....	.....	18 days
323	45	No increase	+ 1	+++	.....	—	4-5 wks.
102	15	No increase.....	+	+++	.....	—	10 days
94	..	No puncture					
49	12	Slight increase	+ 1	+++	.....	.....	4 days
		Mononuclears					
93	40	Slight increase .....	+	+++	.....	—	14 days
		Mononuclears					
54	5	Slight increase	+ 1	+++	.....	.....	5 days
		Mononuclears					
16	30	No increase .....	+	+++	.....	.....	?
280	..	No puncture					
87	20	Very great increase.. Mononuclears 70%	+	+++	.....	—	4 days
351	20	No increase	++ 1	+++	.....	.....	4 days
137	10	No increase	+ 1	+++	.....	.....	3 days
198	30	Great increase .....	+++	+++	.....	.....	12 days
281	40	Moderately increased. Mononuclears 90%	++ 1	+++	.....	.....	14 days
		Slight increase	+ 1	+++	.....	.....	9 days
240	25	Slight increase	+ 1	++ 1	.....	—	14 days
295	30	Slight increase .....	++	+++	.....	—	4 days
304	25	Slight to moderate increase. Monos.	+ 1	+++	.....	—	7 days
391	25	Slight to moderate in- crease. Monos. 90%	±	+++	.....	.....	4 days
395	15	Very slight increase. Mononuclears	++	+++	—	.....	4 days
19	15	Slight increase .....	++	+++	.....	.....	30 days
41	20	Greatly increased.... Mononuclears 95%	++ 1	+++	.....	.....
80	..	No puncture					
254	15	Slight to moderate in- crease. Monos.....	+ 1	+++	.....	.....	15 days

TABLE II.—Continued.
LABORATORY FINDINGS IN CASES OF LETHARGIC ENCEPHALITIS.

Case No.	Amount InC. c.	Cytology	Protein	Fehling's Reaction	Animal Inneculation	Wassermann Reaction	Onset to Puncture
55	30	Slight increase Mononuclears	+	+++	.....	—	7 days
12	35	Slight increase Mononuclears	+	+++	.....	—	7 days
16	60	Moderately increased. Mononuclears	+ 1	+++	.....	—	11 days
40	30	Greatly increased ... Mononuclears	+ 1	+++	.....	—	9 days
66	10	Moderately increased. Mononuclears	+	+++	.....	.....	9 days
65	30	Greatly increased ... Mononuclears	++	+++	.....	—	12 days
357	35	No increase Mononuclears	+	+++	.....	.....	14 days
	15	Moderate increase .. Polymorphonuclears 60%	++	+++	.....	—	3 days
46	25	Bloody fluid .....	++	+++	.....	.....	4 days
	30	Bloody fluid	+ 1	+++	.....	.....	5 days
	20	Moderate increase... Mononuclears 80%	+++	+++	.....	.....	6 days
	20	Moderate increase... Mononuclears 80%	++	+++	.....	.....	8 days
	15	Moderate increase... Mononuclears 95%	++	+++	.....	.....	32 days
	20	Slight to mod. increase	+++	+++	.....	.....	50 days
35	10	Moderate increase... Mononuclears	+++	+++	.....	—	2 days
100	20	Very great increase.. Mononuclears	++++	++	.....	—	2 days
42	20	Slightly increased ... Mononuclears	++	+++	.....	.....	14 days
70	15	Greatly increased ... Mononuclears	.....	.....	.....	.....	3 days
38	15	Slightly increased... Mononuclears	+	+++	.....	—	4 days
332	30	Moderately increased. Mononuclears 80%	+	+++	.....	—	2 days
78	30	Greatly increased ..	++	+++	.....	—	14 days
327	6	No increase .....	++	+++	.....	—	5 days
245	25	Greatly increased ... Mononuclears 90%	++ 1	+++	.....	.....	14 days
187	50 sl. yel. tinged	No increase .....	++++	+++	.....	.....	13 days
317	18	Slightly increased... Mononuclears	++ 1	+++	.....	—	12 days
22	35	Moderately increased. Mononuclears 90%	++	+++	.....	.....	4 days
69	30	Greatly increased... Mononuclears	++	+++	.....	—	5 days
81	25	Moderately increased. Mononuclears	++	+++	.....	—	6 days
331	30	Slight increase .....	+	+++	.....	.....	21 days
83	30	Slight to mod. in- crease .....	+	+++	.....	—	7 days
77	30	Slight increase	++ 1	+++	.....	—	10 days

week. Lethargic encephalitis has occurred in its present appearance during the cool weather, the majority of cases having been adults (my own list of cases shows a large number of children, but this is undoubtedly because I am so often called to see the milder type of case where tuberculous meningitis is suspected). Very few cases of the lower motor neuron type of poliomyelitis are occurring, and among the cases diagnosed as lethargic encephalitis there are evidences of involvement of the higher centers in the way of cranial nerve palsies and prolonged lethargy which are rare even in epidemics of poliomyelitis. Certainly among the hundreds of cases of the latter disease that came under my observation during the epidemic of 1916 there were no cases at all approaching the characteristic picture of lethargic encephalitis, and only a few of the encephalitic type of poliomyelitis, with which some of these milder cases might easily be confused. Moreover, in lethargic encephalitis the onset is usually slow, and death occurs oftenest in the third week. The similarity of the spinal fluid findings is of little significance, since in neither case are they specific. The same may be said in regard to the pathology, though here there are, as a rule, more points of difference. As regards animal inoculation, it is certainly much more difficult to reproduce the disease in monkeys than is the case in poliomyelitis. For all these reasons it seems to me most improbable that lethargic encephalitis is a form of poliomyelitis, though the causative agents in the 2 diseases may perhaps be closely allied. Certainly the organisms described by Strauss, Hirshfield and Loewe in cases of encephalitis closely resemble morphologically the organisms described by Noguchi and Flexner in poliomyelitis. Of course both organisms are so small that it is difficult to satisfactorily study them.

In regard to the possible relation between influenza and lethargic encephalitis, the evidence is as yet entirely circumstantial. In the first place, attention may be called to the fact brought out by historical study that on several occasions epidemics of a disease resembling lethargic encephalitis and influenza have occurred together. The impression is gained from these studies that encephalitis has not appeared in anything like an epidemic form except with influenza. It is certain that in their last appearance, 1889-1890, they occurred simultaneously, and it would seem that enough time has elapsed since for either to appear by itself if there were no direct connection between them. Then again, in a

large proportion of cases, occurring in this country at least, the onset has been preceded by an attack clinically influenza. Moreover, that influenza has a marked effect on the central nervous system is shown in 2 ways: First, in nearly every instance, the convalescence from influenza is characterized by a profound mental depression and nervous exhaustion out of all proportion to the severity of the disease; secondly, as indicated by the reports of Jelliffe, Menninger, Burr and others, influenza is far more likely than any other acute infection to be followed by disturbances of the nervous system either psychic or organic. Therefore, it seems to me probable that there is a definite connection between influenza and lethargic encephalitis. Just what the relation is, I am not prepared to state. Since we do not know the etiological agent of influenza and since the specific cause of encephalitis has not been determined with absolute certainty, though the work done by Strauss, Hirshfield and Loewe must be given great weight, one cannot say that the 2 diseases have the same origin. The virus causing influenza may make the individual more susceptible to the causative agent of encephalitis or it may enhance its virulence, either directly or indirectly by its effect on organisms associated with influenza.

TREATMENT: Lumbar puncture seems to afford so much relief in most cases that its repetition is sometimes desirable. I have felt that it should be repeated not oftener than every week or 10 days in most cases and in many cases only a single lumbar puncture may be indicated. Every effort should be made to keep the patient comfortable and general eliminative and supportive measures should be carried out. Symptomatic treatment should be instituted as the indications arise.

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THE PREDOMINANCE OF SEBORRHEIC ECZEMA IN EARLY LIFE.*

By THOMAS S. SOUTHWORTH, M.D.,

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At the present moment, our views concerning the large group of cases, formerly classed as eczemas, are undergoing revision. The similarity of early forms has led to a wider application of the term dermatitis, especially in the acuter types. There is also a further tendency to separate those cases in which there is a demonstrable sensitization of the body to proteins, and to make a distinction between eczemas of external and internal origin.

The recent trend of pediatric literature appears to be that of considering the majority of infantile eczemas to be due to dietetic or other internal causes, and the value of the excellent work done in this direction, both from an etiological and a therapeutic standpoint, is fully acknowledged by the writer. Nevertheless it would appear that the part played by seborrhea has been overlooked and has failed to receive the recognition which it deserves.

In our pediatric literature and text-books, eczema is described without any reference to seborrhea or else the latter is dismissed with brief mention as an entity apart. Kerley mentions certain intertrigoes which responded to treatment on this basis, but nowhere is there any suggestion that any considerable part of eczemas in early life have this foundation.

My own observation, on the contrary, has been that predominance of the cases of eczema presenting themselves in the ordinary routine of pediatric practice are associated with seborrhea, many of which are mild and would rarely reach the dermatological specialist. The prevalence of milder types led me to examine the severer eczemas with a view to determining the presence of seborrheic manifestations, and I have not been surprised to find them frequently present.

The clue to such basic causation is found about the ears as well as upon the scalp. To trace the seborrheic factor it is necessary to begin with the milder forms upon the face and body whose identity may be established by finding seborrhea upon the scalp and in the characteristic location in the folds above and below the ear. In such cases, if the present condition of the scalp does

* Read before the 31st annual meeting of the American Pediatric Society, held at Atlantic City, New Jersey, June 16, 17 and 18, 1919.

not permit of an exact diagnosis, inquiry will usually elicit the information that the "milk crust or cradle cap" persisted unusually long and was eliminated with some difficulty.

It is unnecessary to describe seborrhea of the scalp, but the ear signs may vary from a mere adherent dry exfoliation to a moist and exuding surface where 2 surfaces are in contact, either above, where the pinna joins the hairy scalp, or below at the juncture of the lobe of the ear with the upper part of the neck. When marked, and with some severe eczemas, the moist surface may invade considerable portions of the sulcus behind the ear.

There is something significant also in the predilection of such eczemas for fat babies fed on breast milks rich in fat, and for bottle babies suffering from disordered digestion caused by a relatively excessive intake of fat. In both groups of infants, we might expect the fat glands of the skin to be more readily subjected to seborrheic disturbance. Towle and Talbot, in their description of cases of eczema associated with faulty digestion of fat, noted "the tendency of the exudative eruption to remain limited to the regions of the head for an appreciable length of time, even for months. Many cases, in fact, showed no tendency to spread to other parts."

Many must have been struck by this proneness to localization, for which no explanation has been forthcoming other than that the eruption tends to appear upon the blushing areas where presumably there is greater vasomotor activity. Such an explanation is not of much etiologic value.

Neither does any internal cause serve to explain this limited and peculiar localization, since any sensitization to proteins or toxins, which have gained entrance to the body, should give rise to generalized manifestations, unless, indeed, there be some local predisposition to determine its localization.

That such a predisposition exists, when there is visible seborrhea in the neighborhood, would not appear to be a presumptuous assumption. In nearly every case of marked facial eczema, some characteristic lesion will be found, if sought for, above or below the ear. No attention has heretofore been called to this association, and it has been generally overlooked. When the auricles are massively involved in the eczematous process, the characteristic lesion is, of course, overshadowed.

Some explanation also is due us for the fact that such facial eczemas tend to involve the hairy scalp rather than the neck and chest. Here the acceptance of a seborrheic predisposition appears particularly reasonable.

While McKee has wisely said that the diagnosis of an internal cause for eczema should not be made until all external causes have been eliminated, there is no real conflict between the two, since internal causes undoubtedly predispose the skin to succumb to external factors. Indeed it is, or should be, recognized that the seborrhea sicca of adults suffers exacerbations with a lowered tone of the body or faulty assimilation due to excessive intake of certain types of food.

Although Pussey states that seborrheic dermatitis of itself does not become of sufficient intensity to produce a weeping dermatitis, we need not limit its possibilities to the dry scaly type, to which our understanding of seborrhea is so commonly restricted. He himself admits the possibility of infantile eczemas of the face and scalp being manifestations of a seborrheic dermatitis, and says that seborrhea of the axilla may become macerated, just as I have above pointed out that in infants it may become moist behind the ear.

To grasp the possibilities of seborrhea in furnishing a starting point for eczema, we must realize the ease with which other inflammations and infections are engrafted upon a seborrheic neighborhood. I have seen an intense dermatitis produced about the seborrheic ear of an adult by the application of a solution of carbolic acid purchased at a drug store. Here the pre-existing seborrhea undoubtedly constituted the predisposing cause for so violent a dermatitis.

The recognition of a seborrheic basis for a lesion by no means excludes the possibility of other micrococcic invasion. On the contrary, it is probable that a majority of the more typical facial eczemas of infancy are associated with a mixed infection.

If further criteria be necessary, such may be found in the recalcitrancy of this group of eczemas to bland ointments. Oxide of zinc ointment, so helpful in other types, is, as a rule, useless by itself in seborrheic cases of even the simplest form. Something else is necessary.

In this connection, we note the prevailing use of the term

"stimulating" to denote such remedies as mercury, tar, and resorcin, commonly employed in various forms of eczema, including the seborrheic. This term undoubtedly arose from their efficacy in some of the chronic, dry and thickened types, where stimulation is necessary.

Such stimulation would not only be unnecessary but possibly harmful in the more acute and moist types. Yet, since we find them distinctly helpful in the moist intertrigoes of seborrheic origin as well as in the dry forms, it is probable that their efficacy is due to their germicidal properties. Indeed, it has been my experience that the bland and soothing ointments of the zinc oxide sort are unavailing until to them are added ammoniated mercury or tar, or resorcin to destroy the microorganisms present.

Beyond pointing out this fact, I shall not go further into the treatment. We all recognize the part played by diet, both in the causation and the cure of the severe facial eczemas of infancy, and that this dietetic factor must be differentiated and corrected before the larger number will yield to our efforts.

My object is attained if I have called attention to the number of minor cases of dry seborrheic eczema, and to the frequency with which scalp and ear manifestations of this condition accompany the aggravated types of facial eczema in infancy.

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CALCIUM BY THE VEIN IN SPASMOPHILIA (Pediatria, Naples, March, 1919). Maggiore injected calcium intravenously in 8 children with tetany, mostly with rachitis. The youngest was 20 months, the oldest 10 years old, and electric tests were applied just before and at 1, 2, 3, 4, 12, 48 and 72 hours thereafter. The dose was 1, 2, 3 or 5 cg. of calcium chlorid with enough of the vehicle to make 5 c.c. Each child was treated twice. No inconveniences were observed from the intravenous administration, while the drug promptly reduced the galvanic excitability of the nerves. This effect was most pronounced by the third hour and began to decline by the twelfth. The responses to the electric tests became approximately normal, and this effect was equally apparent with the second application of the drug.—*Journal A. M. A.*

SOCIETY REPORT

SECTION ON DISEASES OF CHILDREN AMERICAN MEDICAL ASSOCIATION*

FRITZ B. TALBOT, M. D., IN THE CHAIR.

DR. FRITZ B. TALBOT, of Boston, delivered the chairman's address, in which he brought out the fact that many people, both inside and outside the medical profession, were giving more and more thought to the subject of child hygiene. He expressed the belief that in the future this subject would attract more attention, and would draw to the solution of its problems greater minds than it had done in the past. It was pointed out that research into the cause and nature of disease had assumed an importance which was not recognized a decade or more ago, and, as a result of the work done in the past 10 years, the general practitioner was able to treat successfully today many diseases that he was formerly unsuccessful in treating. We also had gained a knowledge of normal physiological processes of the child's body with which we could compare pathological processes, and that had been very important because we had not had any normal standards with which to compare the pathological. The speaker also emphasized the great impetus which preventive pediatrics had received during the war owing to the campaign and propaganda of Children's Year. At the International Conference called at Cannes by the Red Cross it was stated that next to the then present typhus fever epidemic, child welfare had assumed the place of greatest importance of all the specialties represented there. The establishment of normal health in childhood laid the foundation for normal healthy adult life. This foundation might be laid either by attending the individual child or by classes in clinics. Dr. Talbot discussed somewhat in detail the deficiency of pediatric teaching in our medical schools and particularly the failure to teach infant feeding. The medical student in order to get his degree had to care for 12 obstetrical cases. Why should he not care for 20 normal infants, both on the breast and on the bottle, before he received his degree? In this

* Seventy-first Annual Session held in New Orleans, April 28, 29 and 30, 1920. Detailed report specially made for Archives of Pediatrics.

way he would obtain actual first hand knowledge which he never got from books, and when he went into private practice he would be familiar with what he would have to do. Many diseases were becoming extinct. Could not the time used in learning their recognition and treatment be used to better advantage in learning *their* prevention? Every so often it was important that the relative value of subjects should be balanced anew so that teaching could be readjusted to the times. At the present time there was the necessity of understanding social questions that had an influence on health, home life, etc. The social element of medicine could well be taught along with the scientific aspect at the bedside at the same time that clinical medicine was taught. That would bring the pediatrician back to the place that the general practitioner formerly held with so much pride. The teacher of pediatrics should coöperate with those specializing in other subjects and particularly with the obstetrician with the object of enabling the student to acquire a knowledge of the theory and practice of antenatal care. It would be ideal if the student could observe the prenatal care, be present at the delivery and then follow the child for 5 months after birth in a certain number of cases before receiving his degree.

THE TREATMENT OF INDIGESTION IN CHILDREN.

DR. JOHN LOVETT MORSE, of Boston, presented this paper, in which he stated that digestion might be disturbed by decreased powers of digestion or increased work in digestion. Decreased powers of digestion might be due to diseases other than digestive, physical or mental overfatigue or digestive diseases. Increased work might be due to too much digestible food or to indigestible food. The treatment consisted primarily in relieving diseases other than digestive and removing causes of overfatigue. The regulation of intervals between feedings and methods of taking food was often enough to effect a cure. In the more severe cases there was intolerance for individual food elements, often with intestinal fermentation from abnormal bacterial activity. Examination of the stools would reveal which food was badly borne and caused fermentation. A microscopic inspection was often sufficient to determine this but should never be depended upon alone. A microscopic examination should therefore always

be made. In fat indigestion, the stools were large and semi-solid, with the odor of butyric acid, and contained a considerable amount of mucus. Microscopically fat was present, more often as fatty acids and soap. The stools of sugar indigestion were usually loose, greenish, containing acetic or lactic acid and often mucus. In starch indigestion, the stools were usually loose, brownish in color, contained acetic or lactic acid, sometimes butyric acid and occasionally mucus. Almost invariably the starch was changed partially into dextrin. In general the bacteriological examination was not of great importance in diagnosis for usually no additional information was obtained. Usually the character of the intestinal flora could be ascertained from the reaction of the stools. There was no place for the so-called digestants in the indigestion of infancy for there was probably never an insufficiency of hydrochloric acid or pepsin. The treatment consisted in the regulation of habits and the regulation of the quantity of food to the capacity of the individual child. If it was necessary to cut down one food element, this should be made up by substituting another food element in a quantity sufficient to make up the required number of calories. Then the food element that caused the trouble must be given in a small quantity and increased as fast as would be allowed. The diet list must be written out explicitly and the number of calories indicated. A list of foods and their caloric values should also be given to the parents. Dr. Morse said he had found that almost all parents were sufficiently intelligent to use these tables. In cases in which there was marked clinical evidence of fermentation, it was difficult to say what proportion of the disturbance was due to bacteria and what proportion to chemical processes. It was probable, however, that the original difficulty was not due to bacteria. The bacteria could not be changed by giving bacteria by the mouth but only by changing the intestinal contents and this must be done by diet. The only exception to this was the gas bacillus, the growth of which might be inhibited by butyric or lactic acid. There was no place for the use of drugs in the treatment of the indigestion of childhood except for the temporary relief of symptoms. Cure could only be brought about by the regulation of life and diet. Recovery was a matter of years sometimes, but was usually certain provided treatment was kept up for a sufficiently long time.

Discussion.—DR. L. W. HILL, of Boston, said he wished to

bring out 2 points, as he had been seeing a great many of this group of cases. First, Dr. Morse got results which were equalled by very few men in this country not only because he had seen a great many cases, but primarily because he took infinite pains. That was the one thing of importance; one must be willing to work, and to follow the cases closely and to see them often. One must take as much trouble with these cases as with a difficult surgical or obstetrical case. Second, with reference to the relation of bacteria to the food supply, Escherich had brought out the fact in 1886 that the intestinal bacteria depended upon the food supply, and by changing the food supply one could change the bacteria. Two types of bacteria were distinguished, the putrefactive and the fermentative. If the intestine was infected with the fermentative bacteria, one should withdraw the carbohydrates and substitute protein food. If the putrefactive bacteria were present, one should withdraw protein food and substitute carbohydrates. That was one of the most important things in infant feeding. Dr. Hill said that if he had to choose one particular principle in infant feeding that was the one he would adhere to. The intestines were swarming with bacteria and if the infant was overfed the bacteria seized the food and decomposed it, so if the baby was overfed an indigestion with fermentation resulted.

DR. CLIFFORD G. GRULEE, of Chicago, called into question the statement Dr. Morse had made to the effect that you could not change the intestinal flora by administering another type of bacilli by mouth. He said he did not see how they were going to account for certain phenomena unless one admitted that bacteria introduced by mouth did show growth in the intestines. Typhoid bacilli were introduced into the mouth and developed and multiplied in the intestines. It was also true that some types of dysentery were produced by bacilli introduced by way of the mouth. His experience was contrary to that of Dr. Morse. It seemed to him there was no scientific reason why lactic acid bacilli, introduced by the mouth, could not be taken up by the intestines. The latest results obtained by the use of the duodenal tube showed that there was a definite relation between the bacteria in the stomach and duodenum in various types of nutritional disturbances.

DR. L. T. LE WALD, of New York, said he wished to endorse what Dr. Morse had said but he wished to supplement it by a

few remarks on what to do when treatment failed. His work in the study of children had been along the lines of roentgenological diagnosis in cases that did not yield to ordinary methods of treatment. He had a little more distinct view of the subject than the man who saw it only from the standpoint of the pediatrician. Their observations in obscure conditions in adults 10 years ago were about what they were in pediatrics today. A more careful study with the x-ray of cases of indigestion that did not yield to ordinary methods of treatment frequently showed anatomical anomalies, or definite mechanical obstructive lesions that could be dealt with effectively only by knowing the exact nature of the lesion.

DR. ISAAC A. ABT, of Chicago, agreed with Dr. Morse, and said he was particularly impressed by the fact that Dr. Morse had recognized that gastrointestinal disturbances might be produced by constitutional disturbances. He doubted whether there was such a thing as indigestion, pure and simple. Indigestion was but one step in the general metabolic disturbance. The problem was not as difficult as some had thought. It was a question of finding what the difficulty was and of diminishing the amount of the food element that was causing the trouble. So far as placing great reliance on the examination of the stools, he doubted whether this was the most important element in the diagnosis. Some times one found fat when the food was perfectly correct. Personally he had found little help from the examination of the excreta.

DR. MORSE, in closing, said he did not think Dr. Grulee's argument was very good when he spoke of typhoid bacilli in the intestine. Typhoid fever was a systematic infection, and infectious dysentery was a disease of the intestinal walls. By giving bacteria by the mouth they could not be implanted permanently in the intestines, unless the food was also changed so that they had a favorable medium in which to grow. There was a great deal to be learned from the examination of the stools but if one thought because he saw a few fat globules or a little starch that the child had fat or starch indigestion he had better not examine stools microscopically. One must first take what he saw in the normal child as a basis for forming a judgment as to what was abnormal. One thing that furnished more information than any other single thing was the reaction of the stools.

THE TREATMENT OF INDIGESTION IN CHILDREN
FROM 6 TO 12 YEARS OF AGE

DR. HARRY M. McCLANAHAN, of Omaha, read this paper which was based upon the study of 96 school children between the ages of 6 and 12 years. This was the age at which children were subjected to the stress of school life, the age at which the permanent teeth erupted, and the age at which they began to get a little away from close parental supervision. In 24 of these cases there was a history of nervousness and 3 of these children had to be sent away from home before anything could be done for them. In 27 cases there were distinctly diseased tonsils, and 10 of these were associated with adenoids, sufficiently large to cause mouth breathing. These were operated on and all received benefit. Ten of the tonsillectomy cases, however, were operated on without benefit to their general condition. Twenty-five children in this series had distinctly bad teeth, and one point that had impressed him was that these children would not chew their food properly because of pain. Three children, who had malocclusion, were sent to the orthodontist and distinctly improved after treatment. Indigestion in the largest number of these children appeared to be due to high protein feeding and neglect of fruits, cereals and leafy vegetables. Those showing obstinate constipation were fluoroscoped for the purpose of ascertaining if there were anatomical defects present. All had the urine examined several times. Dr. McClanahan recalled that some years ago he had read a paper on the significance of indican in the urine. All of these children complaining of indigestion had an excess of indican in the urine. There were 5 alimentary glycosurias which disappeared under proper diet. Practically all of these children had some nervous symptoms, such as increased irritability, restlessness, grinding of the teeth, etc. Fourteen had enuresis, and 10 of these recovered under rational treatment. Of the series, 52 were constipated and 5 only suffered from emesis. Seven of the children had intestinal parasites. In 25 cases, the abdomen was distinctly enlarged. In those children having epigastric tenderness and pain on pressure, these symptoms were associated with a distinctly red tongue. In the treatment of indigestion in children of this age the most important factor was the coöperation of the mother. It was his rule in all cases to write a simple diet, giving what the child could

have rather than what he could not have. A psychological factor of importance was the gaining of the good will of the child. If there was one factor in the treatment that was important it was that rest and regularity in sleep were of the greatest value in the physiological restoration of the nervous system. Eleven of the nervous children were kept out of school. The importance of regular bathing was also stressed. The essayist said he wished to confess that he used drugs in the treatment of these cases. He found that before these children came under his observation most of them had been drugged to the extreme and he felt that it was better for the children to have some drug under the direction of the average physician than to take drugs of the mother's choosing. The main object of the drug was to get the bowels regular. He had given paraffin at bed-time and had found *nux vomica* valuable given after meals.

Discussion.—DR. LAURENCE R. DEBUYS, of New Orleans, said they should all feel greatly indebted to Dr. McClanahan for bringing up this subject inasmuch as this was a period in the child's life which frequently did not receive sufficient attention. The foundation of the future individual was laid, it was true, during the first 2 years of life and influences were more important the nearer they approached his birth time. However, one could not build a good foundation in infancy and then let the structure go uncared for later on. At the period Dr. McClanahan had chosen for discussion one could not watch the child as closely as in infancy. Indigestion at this period of the child's life had to be considered from 2 view points—that of the child and that of the child in relation to his surroundings. It had been well said that some children were born nervous, some acquired nervousness and some had nervousness thrust upon them. It was sometimes necessary to take these nervous children away from their homes in order to get results. The teeth should receive attention and regularity of habits should be insisted upon. It was important to ascertain the amount of food that the child could take care of and then see that he received this food at regular intervals and nothing between meals. The food should be plain and wholesome, rather than palatable. Unfortunately, too often the parents allowed a child to have what he liked rather than what was best for him. Dr. DeBuys condemned the practice of drugging children and said

that too often the child at this period of life had already become dependent upon drugs, especially as regarded bowel movements. He also condemned the use of glycerine suppositories and soap in infancy; if it was necessary to use something, water should be used.

DR. HENRY DWIGHT CHAPIN, of New York, observed that there were many factors that entered into indigestion in childhood, but that he wished to mention one only and that was to emphasize the deleterious effect of the lack of proper rest. An interesting experiment had been performed in the case of a few children in the public schools of New York. They took the undernourished children in the Public School across the street from the Post Graduate Hospital and gave them a mid-day meal and then weighed the children to observe the effect. They all gained in weight except about a half a dozen. They found that the reason these children did not gain was because they did not get enough rest. By having these children sleep an hour every day they were made to gain in weight. Some children played too hard and over-exerted themselves and this was an important factor in their malnutrition and indigestion. A little more rest would cure some of these cases.

DR. JOHN LOVETT MORSE, of Boston, said he wished to corroborate what Dr. McClanahan had said. He did not think they stood so differently on the question of drugs as Dr. McClanahan had intimated. In his paper he had said that he had no use for drugs except for the treatment of symptoms, but they were not used with the idea of curing the condition. He was glad to hear that Dr. McClanahan used *nux vomica* because that was the one drug he used in cases of this kind. He had found it wise to get the coöperation of the child rather than of the parents. There was one form of treatment that might be called psychotherapeutics which he had taken advantage of. Before examining the child he saw the mother first and had her tell him what the child had eaten for the past 2 meals. He then examined the child's abdomen and told the child what he had been eating; after that the child was afraid to disobey orders in regard to his diet for fear when the doctor examined him again he would find it out.

DR. LYDIA A. DEVILBISS, of the U. S. P. H. S., said it was important to make the child understand that this was his own problem. In their work they had had to make the best of condi-

tions as they found them and to work with such material as was at hand. They told the mother about the child and what should be done; perhaps she would act and perhaps not. They put the child on the scales and showed him that he was underweight and that was a mark against him. The child then immediately became interested and wanted to know why he was underweight and what he should do to come up to the standard. He was willing to do almost anything in order to "go over the top" with the other children. They first corrected physical defects—teeth, tonsils, adenoids, etc.—and then by gaining the coöperation of the child they were able to get results.

DR. GEORGE DOW SCOTT, of New York, emphasized 3 points with reference to the successful treatment of these children: 1. The neglect of feeding stewed and raw fruits which acted as a laxative, diuretic and tonic to the stomach and intestines; 2. The advantages of semi-solid foods, cereal with enough milk to put on the cereal, with toast and cooked food; 3. Bathing was a better tonic than any drug. A bath 15 minutes before meals was a tonic to the nervous system and helped digestion.

THE RELATION OF ACQUIRED FOOD DISLIKES OF CHILDHOOD TO THE ILLS OF MIDDLE LIFE

DR. C. HILTON RICE, JR., of Montgomery, Ala., contributed this paper. He first discussed the phenomena of life and nutrition from the view point of biologic chemistry, showing that a defect in nutrition might not be immediately perceptible but was nevertheless often cumulative in its effect. Against this background the following facts of general observation were set up: 1. All healthy adults and children, with few exceptions, ate a variety of foods. 2. Many children, particularly in the second and third years, left to eat what they liked, turned to the carbohydrates and formed dislikes for essential foods, especially milk, eggs, fresh meats and green vegetables. 3. Many middle-aged sufferers from disturbances of metabolism had food dislikes that dated back to childhood. These individuals had often been anemic and constipated from childhood. After a careful exclusion of other etiological factors the conclusion seemed warranted that the total or partial absence of essential foods over a long period of time might account for much disease of middle

life. This disease was only the masked and remote effect of the gradual, cumulative action of malnutrition on tissues and organs over long periods of time. Some of the conditions that might be related to defective nutrition dating from childhood were hypertension, gastric and duodenal ulcer, visceroptosis, etc.

Discussion.—DR. W. W. BUTTERWORTH, of New Orleans, expressed the opinion that Dr. Rice had presented a new viewpoint in reference to disturbances of nutrition. Instead of looking backward as the internist did, he was looking forward, and while it might be difficult to prove his assertions there was much in them to commend itself to one's attention. For instance, the effects of rickets, which were brought about by deficiency in certain food elements in infancy, were seen later in bone deformities, stunted growth, etc. Pellagra might also be cited as a condition that showed the far-reaching effects of a deficiency in certain food elements. Many of these conditions, due to food deficiencies, were slow in onset and might have disturbances in digestion over years and years before finally definite disease resulted.

DR. FRITZ B. TALBOT, of Boston, said he thought we were all searching back to the cause with the idea of prevention in the background. It was going to be difficult to prove many things but it was obvious that many of the diseases of adult life had their origin in childhood. In regard to digestive disturbances and food likes and dislikes, Dr. Talbot said he had very little experience with patients who were on an extremely unbalanced diet. Education in his community was such that most people came to know what a good diet was. There was, however, a certain group of children who had food dislikes and did not get a well balanced diet. Most of these food dislikes came in certain types of families in which the history showed asthma, hay fever or urticaria and they had food idiosyncrasies due to anaphylaxis. One must bear in mind that food dislikes might be due to anaphylaxis.

DR. MAY G. WILSON, of New York, stated that in 1916 they had made a study of diet in a large group of children and found that outside of potatoes, tomatoes and lettuce there was a lack of green vegetables in the diet. In many children, who were in the lower grades in school, milk was omitted from the diet and tea

substituted. By the time the children were 10 or 11 years of age, they began to use condiments, and acquired a dislike for the essential foods. In a group of 2,000 children, only 5 per cent. used green vegetables.

DR. O. M. GILBERT, of Boulder, Colo., said it fell to him to treat a great deal of tuberculosis and he had observed that a great many of these patients did not like milk or eggs and never could take meat. He felt that this defective diet or lack of dietetic training was an important factor in relation to tuberculosis. There were a few cases with anaphylaxis but they were very rare. With the average individual it was only a matter of taking time and of gradually adjusting the patient to the proper diet. Irving Fisher should be credited with having called attention to the injurious effects of an excess of protein diet after middle life. But a proper protein diet was essential during the formative period of life, and lack of a proper protein diet was a factor in developing not only conditions like pellagra but of tuberculosis as well.

DR. RICE, in closing, said the conclusion he had reached on this subject had come to his mind too recently for him to give statistics, but that he had observed that in Alabama one of the commonest diets of children was bread and cane syrup with too much candy and too many ice cream cones between meals, and that most of these children did not like green vegetables. From the point of view of the pediatricist, they were in a position to look forward and see the effects of the food dislikes of childhood on the metabolic disturbances of middle life better than the internist who got only a fragmentary history.

THREE PERTINENT QUESTIONS ON MATERNAL FEEDING

DR. WILLIAM A. MULHERIN, of Augusta, Ga., read this paper in which he considered the following questions: 1. Should our text books unqualifiedly state that intercurrent pregnancy was an indication for immediate weaning? 2. Might we not question the advisability of immediate weaning in mild typhoid fever? 3. Should not more positiveness exist in our text books regarding the advantages of complemental feeding over the method of alternating the breast and the bottle? In discussing the first question,

he emphasized the advantage of slow weaning when the baby reached a certain age and the breast milk was no longer sufficient to properly nourish it. The evidence seemed to show that uncomplicated pregnancy did no more than weaken the milk and perhaps diminish the quantity so that there was no need for immediate and abrupt weaning. It seemed advisable that in uncomplicated pregnancy weaning should be brought about slowly. With reference to the question of immediate weaning in typhoid fever, the writer stated that in severe typhoid fever there could be no question that immediate weaning was advisable. In mild typhoid fever, however, with the diagnosis made from the tenth to the twelfth day of illness, the breast secreting freely, a positive Widal with the baby's blood, the mother feeling equal to and desirous of nursing her baby, he felt that it might be permissible to continue the baby at the breast and to piece out, if necessary, with complementary feeding. He cited 3 cases in which this course was followed with no ill effects and with possible advantage to both mother and child. It was evident that if the child had been nursing for 10 or 12 days, during which time the mother had typhoid fever without it being known, the danger of the child contracting the disease was greater than after the condition had been diagnosed and care taken to avoid infection. Again the wear and tear on the mother of sudden weaning was perhaps greater than any ill effects of continuing to nurse the infant. There was not much danger of the mother transmitting typhoid fever to the baby through the milk and the child could be protected from infection from other sources. In reference to the third question, he felt that greater stress should be laid on the advantages of complementary feeding over the method of alternating the breast and the bottle. It was well known that stimulation was an important factor in increasing and preserving the milk supply and when the bottle was alternated with the breast the latter received less stimulation and the milk supply decreased. This was an important matter and should be stressed much more than it had been.

Discussion.—DR. JOHN LOVETT MORSE, of Boston, said that in regard to weaning in cases of uncomplicated pregnancy, it seemed to him that it was impossible for a woman to properly nourish 3 people—the infant at the breast, the child in utero and herself. With regard to complementary feedings, Dr. Morse emphasized the fact that he thoroughly believed in breast feeding

and that he believed a great many more mothers could nurse their children than did do so, and that such women should be made to nurse their children. Of course, there was a limit to the amount of milk the civilized woman of today could produce. Personally, he had had no luck in re-establishing breast feeding when it had once been abandoned. There was no question but that it was better to give a complemental feeding than to alternate the breast and bottle, but one had to take into consideration the state of society in which the mother lived. If she was at home it was best to nurse the baby at every feeding time, but if she was a woman with other cares and duties it might be well to substitute the bottle at 1 or 2 feedings a day. There was a certain class of mothers who produced more milk if this plan was followed than if she attempted to nurse her baby every time.

DR. JAMES D. LOVE, of Jacksonville, Fla., stated that in his experience he had seen uniformly bad results from the sudden withdrawal of the baby from the breast where the mother had mild typhoid fever. The danger to the baby was practically nil, much less than from sudden weaning, and the mother was saved the discomfort and nervous wear and tear of having the milk withdrawn artificially; then, too, she had the satisfaction to be derived from being able to nurse her baby. He believed Dr. Morse expressed the sentiments of the section in reference to the advisability of withdrawing the baby from the breast in uncomplicated pregnancy and febrile disturbance.

DR. WILLIAM WESTON, JR., of Columbia, S. C., pointed out that in animals and primitive man the fact of pregnancy was not a reason for the cessation of nursing the offspring. If that was true, why should one insist upon immediate weaning in more civilized peoples. He thought the answer must depend upon how the mother was getting on and how the baby was doing. Personally he believed that if both were getting along well one should leave things as they were.

DR. MULHERIN, in closing, said that he would find no fault with the textbooks if everyone interpreted them as Dr. Morse had done, but the statement was made that one of the indications for immediate weaning was the occurrence of pregnancy. Personally he did not advocate nursing after pregnancy had taken place, but slow weaning. With regard to the complementary and supple-

mentary feeding, the point to be made was that the way to increase the milk supply was not to relieve the breast of work but to make it do more work, as in that way the capacity for work was increased.

HOW PEDIATRIC TEACHING OF NUTRITION MAY AFFECT THE NATION'S WELFARE

DR. HENRY DWIGHT CHAPIN, of New York, read this paper in which he dwelt upon the important part that nutrition played in the development of the child and hence in the future of the nation. The pediatrician was the one most frequently consulted with reference to diet and nutrition in childhood, and hence was in a position to perform an important function in national affairs. That we had not given sufficient attention to the subject of child welfare in all its aspects had been shown by the results of the draft examination which revealed the fact that 1 in every 4 of our young men of draft age was physically defective. An investigation as to the extent of malnutrition among children in certain New York public schools was made and 20 per cent. of the school children were found undernourished. This condition was not limited to the poor but was found among all classes of society. The question that suggested itself was to what extent these physical defects and this malnutrition were the result of the teaching of faulty theories of nutrition. The literature of infant feeding had been based upon the theories of pediatric authorities. It was time to test these theories and see if they were borne out by experience and facts. Animal experiments had shown that poor growth and a satisfactory gain in weight might go on together. Real growth was not simply the storing of water and fat in the tissues. After emphasizing the importance of breast feeding, Dr. Chapin pointed out certain errors in their teachings. We had been taught that the suitability of a food depended upon the quantity of protein, carbohydrate, fat, etc., that it contained. But it must be remembered that there were many forms of proteins, fats, carbohydrates, and mineral substances. Some proteins would produce growth and some would not, so it was easy to see how one might go wrong by basing his estimate of food values simply upon chemical composition. It was quite customary to add bicarbonate of soda to cows' milk to neutralize the acidity, but frequently cognizance was not taken of the fact that heat

rapidly changed the bicarbonate of soda to carbonate. Again the fat soluble and water soluble vitamins played an important part in nutrition. Here it had been shown that the water soluble B. was rapidly destroyed when bicarbonate of soda was added to the food, so that this procedure must be eradicated if milk was to have its full nutritive value. The popular teaching had been that food values were valuable in proportion to the amount of heat they produced on combustion, this being expressed in calories, but it had been shown that much nutrition did not depend upon combustion. There were those who advocated cereals and milk as the best form of food for infants and children. The cereal was used not only for its nutritional value but to adapt the cows' milk to the infant's digestive tract. Milk mixed with cereal formed an efficient food provided a sufficient amount of antiscorbutic was added. The practical advantage of such a dietary was demonstrated on a large scale in Denmark during the war, where the people were given a ration of bread made of bran wheat and other cereals, potatoes, cabbage and some milk. This proved a very satisfactory diet, and practically all our experience in matters of nutrition showed the efficiency of a diet of cereals and fresh vegetables. The real value of protein depended upon its containing the correct kind of amino-acids and not upon whether it was an animal or a vegetable protein. One of the future sources of protein food would be the soy bean, which contained much protein and fat.

Discussion.—DR. JOHN A. FOOTE, of Washington, D. C., congratulated Dr. Chapin on having emphasized the need of active interest on the part of this section in public education, not only of the physicians, but of the lay public, in the matter of food values. The United States Public Health Service went a little further than Dr. Chapin had done in interpreting the statistics of the draft—Dr. Chapin said that 1 man in 4 was found to have some defect; the United States Public Health Service said 1 out of 3 men had some physical defect. When we remembered the large number of men who were examined this meant that there were at least 1,000,000 men of draft age with physical defects which prevented them from doing the work that they might otherwise do, one could appreciate what this meant economically. Possibly the relation of these defects to the diseases of childhood was not apparent at first. Sir Arthur Newsholme, a short time

ago, in an address stated that the same condition was found in England and he believed that they had not understood the importance of having the functions of child welfare work vested in local and national health departments.

DR. L. W. HILL, of Boston, said it was the impression among physicians, as well as among the laity, that children needed a great deal of protein food in order to thrive and grow. He did not think the standard of 2 grams per kilo was correct. There were no accurate figures as to the requirements; what little we knew had been handed down from book to book and from mouth to mouth. He cited an instance of 3 husky boys in one family, ranging in age from 6 to 12 years, all perfectly healthy and athletic, who had always eaten vegetables and never any animal food. These boys weighed from 10 to 15 per cent. above the average of boys of their age and were taller and larger in every way. He had had the chemist at the hospital work out the nitrogen metabolism of these boys and he found that they were receiving an adequate supply of that element.

THE CLINICAL VALUE OF VEGETABLE OILS IN CERTAIN ABNORMAL CONDITIONS OF INFANCY AND CHILDHOOD

DR. GEORGE DOW SCOTT, of New York, read this paper in which 3 classes of cases were studied: 1. Inanition. 2. A subnormal period following gastroenteric conditions, such as malnutrition, marasmus, etc. 3. Conditions such as secondary bronchopneumonias, in lysis or crisis, following acute gastrointestinal intoxications. The fats were poor in oxygen, rich in carbon and hydrogen. After describing the physiology of fat digestion, Dr. Scott pointed out that the primary function of the fats was to furnish heat and that the higher the proportion of carbon and the lower the amount of oxygen the greater would be the heat producing power of foods. The amount of fat needed by an infant could not be stated in terms of calories but depended upon the fat tolerance of that individual patient. The fat tolerance varied greatly in both physiological and pathological conditions. In health, fat absorption varied between 90 and 98 per cent. The excessive ingestion of fats retarded the emptying time of the stomach and delayed normal secretion so that vomiting or regur-

gitation of the food might occur. Healthy children assimilated solidified fats, but the sick or delicate child might reject them. Such patients thrived best on a fluid fat or oil, one whose melting point was at about the body temperature. Such a fat was easily emulsified and digested. It was practically immaterial whether cod liver oil, cotton seed oil, peanut oil, sunflower, soy bean or other oil was employed so long as the little patient enjoyed it. His observations, however, inclined him to prefer olive oil, which was easily digested and absorbed and could be pushed except during the torrid heat of summer. Rosenberg had pointed out that olive oil was a strong cholagogue. The percentage of fat in olive oil was much more constant than that of cream. Olive oil consisted of stearin, olein and palmatin. A number of cases were cited to show that, given with malt extract, it served to bridge over the time when the amount of carbohydrate or protein had to be limited in various conditions of malnutrition or following acute illness.

ACRODYNIA

DR. WILLIAM WESTON, JR., of Columbia, S. C., said that the general impression seemed to have been that this was a Southern disease, or one confined to particular sections of the country. On the contrary, this disease was found universally and was probably more frequent in the West than in any other section of the country. The Surgeon General's Library reported a great paucity of literature on the subject. There were records of previous outbreaks in this country. Acrodynia had been confused with malaria, pellagra, and beri-beri. The purpose of this paper was to ask physicians to be on the lookout for this disease in order that it might be studied and further information regarding it obtained. Though the etiology of acrodynia was unknown, the fact that it generally occurred as an epidemic suggested that it was probably due to some organism. The children attacked by this disease lost appetite, became listless; some manifested gastrointestinal symptoms; in some there was diminished weight, and diminished reflexes had been noted. There was often profuse perspiration and the hands and feet became cold, swollen and tender, and about one half the cases were painful to the touch. Photophobia, conjunctivitis, and gingivitis had been observed. Of his 8 cases, all but 2 had gotten well.

A point that had impressed him was that he did not feel that anything he had done for them had been of any benefit except in 1 case in which a balanced diet of vegetables, eggs and milk had seemed to be beneficial. There were descriptions of an epidemic of this or a similar disease in Paris, in 1828. Several German writers had also described the condition under various names. It had been described, under the name of podalgia, as occurring in India. It had been observed in barracks among soldiers where the conditions were the same, yet in one barracks one set of symptoms would predominate and in another barracks a different set of symptoms would be noted. The first symptom was pain in the hands and feet with tingling and burning. These sensations and the pain were aggravated at night and in wet weather. Many skin manifestations had been described; edema sometimes occurred, confined to the extremities. The skin dermatitis was different from that of pellagra and it did not seem to be due to any specific dietetic error. The prognosis under favorable circumstances was fairly good. There was no specific treatment known for the disease at the present time, though diet and hygiene were important factors in the treatment.

Discussion.—DR. A. H. BYFIELD, of Iowa City, Ia., reported that during the past few years he had had 14 cases of this disease and that it was so definite, so clear-cut and so unmistakable that the nurse had in several instances made the diagnosis before the doctor saw the child. Even when the characteristic eruption on the hands was absent, the internes had been able to make the diagnosis upon the extraordinary picture of wretchedness which the child presented. One characteristic thing was that the child preferred to bury his head in the pillow and suffered from paresthesia of the extremities. There were very few diseases that aroused one's sympathy to the extent that acrodynia did. The skin dermatitis was sharply differentiated from that of typical pellagra. Cases were reported in which the teeth came out. The speaker had observed no very striking change in the gums. He had observed a double keratitis and a pulling out and falling out of the hair. There seemed to be an extensive involvement of the fifth nerve. Anorexia was sometimes very striking; in some cases this became so severe that it became necessary to resort to stomach feeding. The nature of the disease was that of a sensory

polyneuritis. In the first case he saw he made a diagnosis of trophoneurosis. In his cases the question of diet had been gone into as carefully as possible, and a number of the cases were in breast fed babies. In only 1 or 2 cases did the diet present anything that was open to reproach. All the cases had a leucocytosis; some as high as 27,000. Reflexes were sometimes present, sometimes absent. The spinal fluid findings were negative. Pellagra usually had a history of gastrointestinal disturbances at the onset. In practically none of the cases of acrodynia was this stressed, but rather emphasis was laid upon a respiratory factor. Jacobi gave a brief description of acrodynia as a complication of diphtheria and he had been impressed by finding a diphtheroid organism in the nose, and the diphtheroid organisms might be distinctly toxic though he knew that they were in disrepute as etiological agents at the present time. He had been impressed by the fact that though a scientific diet, containing antiscorbutic vitamins, was given the paresthesia continued for weeks and months. He was inclined to think that respiratory infection, if it was primarily responsible, at least played an important role; if the diet played some role it must have been a slight one. They were inclined to think they were dealing with a polyneuritis because at autopsy it was found that the anterior horns in the mesial aspect had lost their power to take stain.

DR. JOSEPH GOLDBERGER, of Washington, D. C., said he had been interested in acrodynia because of its possible relation to pellagra, though he had not seen anything that he was prepared to say was acrodynia. The loss of weight, the edema and the eruption were part of the picture of pellagra. The older descriptions of acrodynia emphasized certain definite things in respect to the eruption. In the older descriptions, the eruption was spoken of as favoring the palmar surfaces of the hands and feet; it was known that the palmar surfaces of the hands and feet might be affected in pellagra. Dr. Goldberger said his suspicion would be that they were dealing with a nutritional condition in some way allied or related to pellagra. As he believed was the case in pellagra, there was not a distinct specific condition but a combination of symptoms due to corresponding defects in diet. There was a range in dietetic defects and therefore a range in the manifestations of those defects. At a certain point, the defect in the diet

caused a certain clinical manifestation which might be considered as coming under acrodynia. Further along one would have pellagra and then edema. If one went still further up the scale he would find the manifestations of the gastrointestinal tract and still further along the nervous manifestations. One could not regard this as settled but he regarded it as a very useful hypothesis and a suggestive line of research. In studying these cases, it would be extremely valuable if the clinician would record not only the clinical manifestations but would make careful note of the diet of the individual for a considerable period of time prior to the first manifestation of the disease, possibly a quantitative statement of the ingredients of the diet for a considerable period of time.

OBSERVATIONS ON THE SALT CONTENT OF BREAST MILK

DR. WARREN R. SISSON and DR. W. DENNIS, of Boston, presented this paper which was read by Dr. Dennis. He stated that the fact was recognized that the standard amounts for fat, carbohydrate, and protein used in the diets of infants had been established in large measure. It was also recognized that a large class of infants fed on so-called rational mixtures might develop intestinal disorders. Attention had been attracted to the relative and absolute proportions of fat, carbohydrate and protein with absolute disregard to the mineral content of the diet. It was assumed that the salts being in excess in breast milk had no effect on nutrition. During the last 5 years relatively simple methods had been devised for the determination of the mineral constituents of the blood and it had been a simple matter to adopt these for the estimation of the salts in milk with a quantity of milk as small as 10 c.c. About 1 year ago, they started a study of the mineral constituents of breast milk and of the ordinarily used modifications of cows' milk with the idea that by a study of this kind it might be possible to trace the connection between obscure intestinal disorders and the mineral content of the milk. About 400 samples of breast milk were taken from the first day to the eleventh month. They found that during this time the chloride content was not changed and that the average was about 50 mgs. to 100 c.c. or 0.5 of a grain to the liter. This was about the average figure given in the text-books. They felt, however, that

these averages were of little value because of the very great variation in the chloride content in different mothers. Samples of milk were taken at different hours of the day from 6 A. M. on. These showed the chlorides excreted in a perfectly uniform way and with little change from day to day. In some mothers, particularly those of the nervous type, however, tremendous variations occurred from hour to hour. They might start with 20 mgs., go up to 50 mgs. and then fall back again. In looking up the histories of the infants in these cases, it was found that though nursing at their mothers, they were not gaining as they should. They had also examined a large number of formulas for bottle fed infants in Boston and found that the ordinary salt content was about 75 per cent. But this was not the case with the whey mixtures used in the younger infants. In these whey mixtures, values up to 200 were frequently found. This suggested the possibility that the high chloride content might be a factor in the gastrointestinal disturbances so frequent in infants on whey mixtures.

Discussion.—DR. FRITZ B. TALBOT, of Boston, said that when they were feeding babies on whole milk mixtures and for various reasons put them on whey, cream and sugar, it was sometimes noticed that the babies had diarrhea, and they often noticed in private practice that babies on breast milk had more movements than they thought these babies should have. This work suggested that the chlorides were the background of the diarrhea, but it did not tell why one baby could take chlorides and another could not. Another point was the clinical observation of Dr. Sisson that the character of the nervous system of the mother, who had high chlorides in her milk, was apt to be less stable than that of the mother whose milk went along the level supposed to be normal.

CHRONIC NEPHRITIS IN CHILDREN

DR. LEWIS WEBB HILL, of Boston, stated that acute nephritis in children was usually a long drawn out affair and the nephritis could not be called chronic until the albuminuria had existed for a year. The chronic nephritis of children differed from that of adults because in adults we were dealing with a kidney that had gradually become damaged while in children the kidneys had been suddenly damaged. In adults there were usually concomitant

cardiac conditions which were as a rule absent in children. The paper dealt only with the mild type of chronic nephritis. Tonsillitis seemed to be the most important etiological factor. They had never seen a case due to dental trouble though they thought it might occur. In these mild cases there was usually a small amount of albumin, casts, and red blood cells. The blood pressure was usually normal or below normal. This form of nephritis was differentiated from orthostatic albuminuria, where the albuminuria was temporary and due to posture, and the urine did not contain red blood cells and casts. The 2 hour functional test of Mosenthal was studied and found to be a most practical test in children. It was found that the normal phthalein for children was higher than for adults. An excretion below 50 per cent. meant severe damage to the kidneys. Blood urea examinations were made and led to the belief that damage to the kidney, in the mild cases, was not sufficient to cause marked urea retention. In the treatment of these cases general hygiene was most important. The lives of these children should be carefully supervised. Plenty of rest, physical and mental, and plenty of good nourishing food were essential. The nephritic child might bathe in water 70 degrees or over but the surface of the body should not become chilled. The tonsils and teeth should receive attention. The tonsils which were the cause in many cases should be removed, if there was the slightest suspicion that they might be the source of infection. It was of the utmost importance to guard against acute infections, since the kidneys were hypersensitive and should not be called upon to eliminate toxins of any kind. It was a mistake to restrict diet too closely. The diet of those children might include meat and eggs in moderation, a moderate salt intake and plenty of water. There were 3 prognostic possibilities: First, the kidney might recover entirely after several years; second, a severe and fatal chronic nephritis might follow; third, a contracted kidney might result, giving rise to the picture of chronic interstitial nephritis. We had not seen the third occur. It was quite possible to recover from this type of chronic nephritis. A normal phthalein output was not of much value as regarded prognosis, but an abnormal 2 hour test meant a damaged kidney, though not necessarily a severely damaged one.

Discussion.—DR. C. W. WAHRER, of Fort Madison, Ia., said

that these cases of nephritis in children were usually secondary infection, following tonsillitis, rheumatism, etc. They were more frequent in boys than in girls, because boys subjected themselves to greater exposure. They had been told that diet had a great deal to do with it, but he would suggest warm clothing. One should be cautious in the use of drugs in these cases, because an irritating drug might cause an acute exacerbation of the nephritis in chronic cases. In regard to the prognosis, his experience was that it was favorable rather than unfavorable. The majority of these mild cases usually made a recovery, but they should remain under the care of a physician and be watched closely for a long time.

DR. JOHN LOVETT MORSE, of Boston, expressed the opinion that one of the most difficult things in connection with these cases was to determine where the subacute nephritis ended and the chronic began. Almost all the cases that started as acute ran into subacute and chronic, and one did not know what length of time made the diagnosis. Speaking of the preventative treatment, the vast majority of physicians were satisfied if they succeeded in getting the urine free from albumin once, but one could not call a patient well on 1 negative examination. The patient was not well until the urine was microscopically clear after centrifuging.

DR. GEORGE DOW SCOTT, of New York, said that at the Willard Parker Hospital in New York they saw a great many of these cases following the acute infectious diseases and it had been observed that the younger the patient the more quickly recovery took place, so that the prognosis depended to a considerable extent upon the youth and the early nutrition of the patient. Bathing and fresh air were important.

DR. HARRY M. McCLANAHAN, of Omaha, spoke of the results of nephritis in childhood upon the adult, and cited cases showing that some cases apparently made perfect recoveries, while in others serious conditions developed and proved fatal. He had never seen acidosis in these cases. He believed it was more likely to occur in adults with contracted kidneys. He did not believe that chronic nephritis was always a mild thing in childhood; they saw children with severe chronic nephritis just as they saw it in adults. So long as there was sediment, and red blood cells in the

urine, one should be very careful in allowing the child to be up and about.

INFANTILE SPINAL PROGRESSIVE MUSCULAR ATROPHY—(WERDNIG-HOFFMAN)

DR. EDGAR J. HUENEKENS, of Minneapolis, presented this paper. After reviewing the literature of the Werdnig-Hoffman and Oppenheim syndromes, he discussed the evidence for and against their identity. He presented for comparison the differential diagnosis of Marburg showing that Oppenheim had termed the condition indicated by his syndrome as amyotonia congenita and had described it as (1) congenital; (2) usually single; (3) showing generalized hypertonia; (4) atrophy masked and not grossly apparent; (5) tendon reflexes absent; (6) stimulated by electricity; (7) course usually marked by improvement. The Werdnig-Hoffman description was as follows: (1) Acquired in early infancy; (2) usually familial; (3) localized atrophies, usually beginning in the pelvic region and spreading; (4) atrophy easily recognized and apparent; (5) tendon reflexes proportional to atrophies; (6) reaction of degeneration; (7) course of the disease progressive, the child becoming a mere skeleton at 4 or 5 years of age. The essayist analyzed these syndromes and expressed the opinion that they were extreme types of the same disease. He described the anatomico-pathological basis as being the same in both conditions. He then reported a case of typical Werdnig-Hoffman type with necropsy findings which supported the conclusion that amyotonia congenita and Werdnig-Hoffman disease were extreme types of one and the same disease. He called attention to the fact that this was the first necropsy on a typical case of Werdnig-Hoffman disease in this country.

Discussion.—DR. FRANK C. NEFF, of Kansas City, regretted that Dr. Heuenekens did not read his autopsy findings, but felt that there was such a variation in the symptomatology that he could scarcely accept them as the same condition. He thought the diagnosis had to be based on the autopsy findings.

DR. JOHN ZAHORSKY, of St. Louis, thought that between myatonia and Werdnig-Hoffman there was a wide distinction and it would take a great deal of study on the part of the pathologist to convince him that they were the same disease. The course of the diseases was entirely different. The Oppenheim disease was a

congenital disease in which the baby did not commence to use its muscles early but gradually developed; he had such a case now which was gradually approaching normal. Another case had died not of the disease but of an intercurrent infection, while the Werdnig-Hoffman cases went from bad to worse and died of paralytic symptoms and complications.

DR. HUENEKENS, in closing, said that his case was a typical amyotonia congenita in the beginning. The point to be emphasized was there was no difference in the pathology between these diseases. The improvement that seemed to be noted in Oppenheim's disease was only temporary; these patients all died later just as they did with Werdnig-Hoffman disease.

NEWER IDEAS OF HEART DISEASE APPLIED TO PEDIATRICS

DR. RICHARD S. EUSTIS, of Boston, reviewed the work of Lewis, Barringer and Rapporte with reference to the differentiation of functional and organic heart disease as it had been applied in the army and made a plea for its adoption by the pediatrician in dealing with cardiac conditions in children. He pointed out that the systolic murmur should be considered merely as a signal for a more careful examination of the heart. Systolic murmurs were of importance in children only where they were due to congenital heart disease. Many children with poor exercise tolerance fell into the effort syndrome group. The significance of a low pitched diastolic rumble, reduplicated second sound, and pre-systolic crescendo were discussed. In certain respects the findings in children were somewhat different from those found in adults. In adults the transverse diameter of the heart was one-third to one-half the internal diameter of the chest. In children this measurement was not so certain. For this reason slight or doubtful enlargement of the heart was of little value in diagnosis. Definite enlargement meant cardiac disease. It was safe to regard as potential cardiacs those children who had rheumatism or chorea. The determination of the functional capacity of the heart was of great value. It should be remembered, however, that exercises carried out under observation often introduced a nervous element which gave a wrong impression. Dr. Hill presented an analysis of a series of 52 children to whom the principles employed in cardiac examina-

tions in the army were applied. In this series were 28 normal children, while the remainder exhibited various kinds of murmurs and there were a few suspicious cases. In the series were 19 children with systolic murmurs in whom there was no etiological factor and 15 of these were considered to be normal hearts. The series was considered too small to warrant conclusions, as definite information could only be obtained by following these children into adult life.

Discussion.—DR. JULIUS H. HESS, of Chicago, said he believed it would be a good plan to adopt Dr. Eustis' method by which he used the exercise tests employed in the army in the study of cardiac conditions in children. Many children in whom organic cardiac disease was diagnosed on the basis of a loud systolic murmur were restricted in their lives so that they did not develop properly and their education was interfered with. It was certainly desirable to differentiate these children from those having organic heart disease.

DR. J. M. DODSON, of Chicago, suggested that a better term than normal was range of the normal. There was no such thing as a normal heart. The student was apt to take as his criterion of a normal heart the first heart he examined. There were no 2 hearts exactly alike, but slight shades of difference within a normal range.

DR. ISAAC A. ABT, of Chicago, recalled that 20 to 25 years ago the German authorities made the statement that there was no such a thing as a functional murmur in a child under 2 years of age. Organic murmurs might be both congenital and acquired and might occur at any age. With reference to diagnosing disease of the heart, it was well to remember that the heart might be diseased in any layer—the pericardium, the endocardium or the myocardium. The myocardium was frequently affected after acute infections and there was scarcely an acute infection that did not leave its mark on the heart muscle.

DR. EUSTIS, in closing, said he was glad to hear that there had been difficulty in distinguishing between functional and organic cardiac conditions. That was the reason he was so enthusiastic over this method of determining the condition of the heart by functional tests. Such tests must be interpreted with caution, however.

CIRCULATORY REACTIONS IN NORMAL CHILDREN AFTER EXERCISE

DR. MAY G. WILSON, of New York, stated that exercise was necessary for the development of the normal child and that it was important in the child with chronic valvular disease, to decide how much exercise might be allowed in a given case. The determination of this matter on the basis of clinical symptoms or subjective statements was open to error, hence an accurate method of determining exercise tolerance was desirable. It was well known that the heart reached the limit of its powers before the skeletal muscles. According to Mackenzie the functional efficiency of the heart depended upon its reserve powers. The test applied was based upon the circulatory reaction to muscular exertion. Heretofore, the reports of the circulatory reaction to exercise in children had been limited to changes in the pulse rate. Estimation of the blood pressure in children had not been considered to be of value. The present study undertook to ascertain whether the circulatory reactions were similar to those found in adults and whether anything could be found to act as a guide or check to determine the exercise tolerance. Observations were made on 20 normal children between the ages of 6 and 12 years. Repeated observations were made following the termination of the graduated exercise on pulse rate, systolic blood pressure and clinical symptoms. Over 500 tests were made representing 150 complete experiments, which consisted in 3 or 4 graded test exercises with 1 or 2 iron dumb-bells varying from 3 to 10 pounds in weight, swung from the floor to a position over the head from 10 to 60 times. The blood pressure readings were made immediately upon the termination of the exercise and at 2 minute intervals. The effect on pulse rate of increasing amounts of exercise was noted and the time required to reach normal. The normal curve of systolic blood pressure immediately after the termination of moderate exercise was plotted, and variations in the systolic curve after increasing amounts of exercise noted. The conclusions reached were that the circulatory reactions to graduated exercises obtained in normal children were similar to those reported in adults. It was found that there was a constancy of circulatory reactions immediately following similar graduated exercises at 2 day intervals over periods of weeks in a

given individual. It was shown conclusively that exercise tolerance could not be determined by the pulse rate. The systolic blood pressure curve, however, was significant and of great value in determining exercise tolerance. In over-fatigue, this curve showed an increased period of rising, a delayed rise or delayed summit, and a prolonged period of falling. In general the increase in breathlessness, dyspnea and fatigue were directly proportional to the delayed rise and prolonged fall of the systolic curve. These experiments had also demonstrated that by means of graduated exercises the exercise tolerance of a child could be increased.

Discussion.—DR. ALEXANDER LAMBERT, of New York, pointed out that the value of Dr. Wilson's work was that it showed that the human organism worked as a whole from the beginning of life to the end, and that which was true of the adult cardiac muscle was true of that of the child. The test described did not depend upon reaching any particular number of mm. of mercury, but upon a definite blood pressure curve, and it taught what was happening in the myocardium. It taught that it was the energy content of the heart muscle and not what you heard that was of importance. Many a useful young man had been thrown out of the army because he had a murmur in the second left pulmonary space. Such a murmur was found in many children and chiefly in vigorous young adults. This murmur was caused by the conus arteriosus rubbing against the chest wall, because the lung was not big enough to cover the heart and the murmur frequently disappeared when the lung was expanded. By this method, after a child had had an attack of sepsis or endocarditis, one could judge whether that individual child could take a certain amount of exercise. Mitral stenosis was more common in girls than in boys because when the mitral valve was involved a boy was not so easily controlled and broke open the slight adhesions that formed at the base of the valve while a girl was afraid of overexerting herself and the mitral valve closed at its base.

DR. MAUD LOEBER, of New Orleans, emphasized that Dr. Wilson had given them a definite guide so that they could know just what to do in regard to giving children permission to take exercise. This would be of particular value in schools or gymnasiums. The test used most frequently had been to go by the pulse rate, but

this work had introduced an entirely new idea and would make them review the methods they had been using in permitting children to enter competitive tests and games.

DR. WILLIAM P. ST. LAWRENCE, of New York, stated that Dr. Wilson had confirmed the work of Barringer, Rapporte and Lewis. These curves which she had demonstrated were sufficiently accurate for clinical purposes; however, their interpretation was still a matter of judgment. Dr. Wilson had studied these curves in cardiac children and had treated children by graduated exercise with the methods of Lewis. These she had found of considerable use within rough limitations. Her precise methods, however, would be a great addition to the subject.

DR. FRITZ B. TALBOT, of Boston, congratulated Dr. Wilson on her paper, more particularly because it was a study of the normal, and it was by the study of the normal that pediatrics would be advanced. Although he had made no actual measurements, he thought what she said of the child applied also to the infant judging from certain observations that he had made during metabolic experiments in infants.

DR. E. C. FLEISCHNER, of San Francisco, said that the important feature in all this work was that it was one more point indicating that the main thing in the observation of cardiac cases was the appearance of the child. He hoped in closing the discussion she would mention the color of these children. As one watched the cardiac child, he was struck by the fact that frequently the effect of exercise was indicated by the color of the child. Another point was how they would be able to make mothers graduate properly the exercises in normal children. Many mothers showed no judgment in regulating the amount of exercise of their children and many young children were unduly fatigued because the inclination of the nurse rather than the exercise tolerance of the child was the guide as to the amount of exercise the child took.

DR. WILSON, in closing, stated that she was now interested in exercises for cardiac children and had been impressed by how much many of these children could do and how little we had appreciated this fact. The curve demonstrated was not exact but was a check on personal observation. One should observe the symptoms of overexertion in normal children and then check up on

his own judgment; then this method would be found to be of practical value. She had found it a good plan to do this work with the mothers present, for when they saw the work they were convinced and were willing to follow directions.

INTUBATION OF THE LARYNX

DR. HENRY J. CARTIN, of Johnstown, Pa., reviewed a former communication reporting 317 cases of intubation in laryngeal diphtheria. He had now collected additional cases, bringing the number up to 440 cases. The mortality was 14.5 per cent. He made a plea for a more careful diagnosis, as he believed that many cases of so-called croup were cases of laryngeal diphtheria, and urged the early administration of antitoxin in large doses. He gave 20,000 units as the initial dose. Most of these intubations were performed in the home, and in homes of the poorer classes where all facilities were lacking. He formerly had operated only when stenosis threatened life, but after several losses he had concluded that it was better to operate early; he then began to operate when there was beginning dyspnea. Some of the cases at that time might have recovered without operation, but he thought it safer not to take the chance where these children were in homes, and not under the constant supervision of the doctor or nurse. On the other hand, no case was too far gone to be deprived of the chance for life that intubation might offer. He used the O'Dwyer hard rubber tubes with the child in the dorsal position. After the operation the string was removed. He used rather large sized tubes and had not found that they caused paralysis. The tube was usually removed on the fifth day. In this series of cases there were no chronic cases and no tracheotomies. Where reintubation was necessary it was usually within the first 2 hours following the introduction of the tube. After a detailed analysis of these cases, Dr. Cartin concluded that the low mortality, 14.5 per cent., was due to early intubation and large doses of antitoxin.

Discussion.—DR. ISAAC A. ABT, of Chicago, said he had had the privilege of hearing Dr. Cartin's former paper in 1917, and at that time was very much impressed with the work he was doing and with the success that attended it. This operation was not being performed as frequently as it formerly was because children were receiving antitoxin earlier and there was not so frequent need for it. Dr. Abt called attention to retraction of the in-

tercostal muscles and retraction at the end of the sternum and upper portion of the manubrium as evidence of laryngeal stenosis. There were of course minor degrees of stenosis in which this picture might not be so marked. If the patient was in a hospital, where he could be watched by an interne, one could wait a reasonable length of time before operating, but where the patients were distributed over a wide area and more or less inaccessible one could stretch the indications for intubation. Everybody was not master of the technic as Dr. Cartin was, and as Dr. Cartin had suggested intubation was becoming a lost art. The younger men knew very little about the operation or the technic. He had rarely intubated with the patient in the recumbent position, having preferred the vertical position advocated by Dr. Northrup. In using tubes of large size, it must be remembered that the trauma inflicted was greater in proportion.

DR. L. T. ROYSTER, of Norfolk, Va., stated that he had had an average of about 13 cases requiring intubation every year for the past 20 years. In every community there should be 1 expert intubator. With proper assistance, an expert should be able to perform the operation in 10 seconds and very rarely should he have to make a second attempt. He also felt that it was better to intubate early, even unnecessarily, rather than wait until too late. Many of these children did not die of diphtheria septicemia but of cardiac failure because of the additional work thrown upon the heart which was compelled to work against a stenosed larynx. It was well never to take chances with a case of croup unless one was certain that it was a catarrhal and not a membranous croup. It was better to do a tracheotomy than to intubate the same patient 8 or 10 times. One should never allow the child to become cyanotic before intubating.

DR. A. J. SCOTT, of Los Angeles, stated that in their county hospital service they had 2 or 3 cases of laryngeal diphtheria every month. The point he wished to bring out was that laryngeal diphtheria started out like croup and the parents did not pay any attention to it and neither did the physician. In giving antitoxin he never gave an initial dose of less than 20,000 units when there was a beginning laryngeal stenosis and he preferred to make the injection in the vastus externus, high up.

DR. SOLON G. WILSON, of New Orleans, said he had changed

his opinion many times during 22 years, and one point on which he had changed his mind was as to the length of time the tube should remain in place. There were different opinions on this point in different countries. In France, they left the tube in only 24 to 48 hours. He agreed with Dr. Cartin that 5 days was about the correct time. Dr. Wilson said he never intubated with the child in the recumbent position.

OBSERVATIONS ON TUMORS OF THE KIDNEY IN CHILDREN

DR. WILLIAM E. CARTER and DR. LANGLEY PORTER, of San Francisco, classified tumors of the kidney in children as follows: 1. Malignant tumors—sarcoma, adenosarcoma, teratoma, sarco-carcinoma. 2. Benign solid tumors—lipoma, chondroma, osteoma, fibroma, adenoma. 3. Cysts—congenital cystic kidney, hydronephrosis, pyonephrosis, hydatid cysts. They found the greatest number of cases of tumor of the kidney in children between the sixth month and the sixth year of age. In going over the records of 3 hospitals and their private cases, they had collected 12 cases of tumor of the kidney in the past 5 years. These all occurred in children under 7 years of age. There seemed to be nothing in the histories of the pregnancies and labors to explain them. The most distinctive physical signs of tumor of the kidney in children were fullness at the costal vertebral space and at times intermittent hematuria. Tumor of the kidney might be confused with tuberculous peritonitis, but usually fullness at the costal vertebral angle served to make the differentiation. Other symptoms and signs were asthenia, pain, presence of varicocele, Lucas-Campionnière's sign, secondary blood changes, and digestive disturbances. Kidney tumors were differentiated from adrenal cystoma by the eye symptoms. Frequently metastases occurred early and were sometimes observed before the original growth made itself manifest. The treatment was surgical. The 12 cases were reported in detail.

Discussion.—DR. L. T. LE WALD, of New York, reported 1 case of kidney tumor in a baby 6 months old in which there was a hydronephrosis and referred to 2 other cases of cystic kidney in babies, all 3 of which were operated upon successfully, though the

impression was given by a urologist and other physicians who examined them that they were inoperable.

SIR HUMPHREY DAVY ROLLESTON, of London, expressed his admiration for this paper which he said showed not only a very extensive acquaintance with the literature of this subject but a great deal of personal observation. He then discussed the difficulties surrounding the study of the pathology of tumor kidneys in children and their classification, referring particularly to the difficulty of determining in some instances whether the tumor was of embryonal origin, and of drawing the dividing line between sarcoma and leucemia before the blood changes became marked. He also spoke of rhabdomyosarcoma, which he said had impressed him as being very rare in children. He had never come across a kidney tumor in a child containing striated tissue. In discussing the clinical aspects of kidney tumors in children he said that the position of the colon, in front or below the kidney, might be of aid in differentiating between renal and adrenal tumors. In malignant tumors, producing secondary growths, often the first symptoms appeared in the eyelids, and eye symptoms pointed to a tumor arising from the medulla. There was also an interesting group of tumors arising from the cortex which gave rise to 1 or 2 changes. There might be a precocious growth of hair or a change in the muscle tissue with a deposit of fat infarcts, producing the infant Hercules type. In connection with tumors of the cortex, another interesting point was that the question had come up whether they might not arise from bits of adrenal tissue in the kidney cortex, and if such was the case whether they were not comparable to tumors arising from the renals.

THE TEMPORARY TEETH: DISORDERS DUE TO THEIR NEGLECT

DR. J. ROSCOE SNYDER, of Birmingham, Ala., declared that pediodontia was still in its infancy but merited culture and development. The care of the child's teeth was a subject that until recently was ignored by the pediatricist and neglected by the dentist. The dentist was not altogether to blame if he gave more attention to the apparently more urgent and more lucrative demands for his services from adults. The majority of dentists had neither the time nor the inclination to treat temporary teeth. The early care

of the child's teeth was a matter in which the pediatricist should assume greater responsibility. It had been estimated in New York that 98 per cent. of all teeth were perfect when they emerged from the gums but that by the time the children reached the first grade in school 98 per cent. of them had bad teeth, and one-third had abscess conditions. Equally bad conditions had been revealed by the inspection of the mouths of school children elsewhere. Much time was spent in the preparation of the food supply so that it should be free from contamination and properly prepared, yet when it passed through a neglected mouth it might become contaminated and give rise to gastrointestinal disturbances. In the presence of an unclean mouth, infection occurred more easily. The premature loss of the deciduous teeth was the most frequent cause of malocclusion and deformities of the face and jaws. There was great need in every community of education as to the need of early dental hygiene and prophylaxis. The education of parents in this matter should not be left to the dentist but was a responsibility which the physician, and particularly the pediatrician, should assume.

Discussion—DR. JULIUS P. SEDGWICK, of Minneapolis, said he was very glad to hear this paper, for frequently they had cases which were obscure in diagnosis which were cleared up by examining the teeth carefully. He cited an instance of 1 child sent from Oklahoma to Minneapolis to recover from malaria. This child's teeth were properly cared for and the malaria disappeared. They had in their children's clinic, attached to the University, dentists who cared for the children's teeth. In their private clinic they also had a dentist, and they found that many times he helped to make the diagnosis in obscure cases. As to the prophylaxis, Dr. Snyder was quite right; children should be sent to the dentist regularly.

DR. ISAAC A. ABT, of Chicago, called attention to the fact that most dentists now hesitated to extract the temporary teeth because if they were removed there was no room left for the eruption of the permanent teeth, and malocclusions and deformities resulted. In addition to what had been said of the influence of proper feeding on the teeth, there were other diseases of infancy that had an effect on the teeth later on. Tetany in infancy might be responsible for poorly developed teeth, enamel erosions, and lamellar catar-

act. The question was one which deserved further consideration. He suggested that some of the men who had the opportunity to see a number of children should study the relation of malocclusion and other dental conditions in relation to their effect upon constitutional states, growth, nutrition, development, blood conditions, etc.

DR. LAURENCE R. DEBUYS, of New Orleans, brought out the point that the care of the teeth should begin when the first tooth erupted. Too frequently parents waited for the appearance of several teeth before they began to use the tooth brush. Another point that had impressed him was the slightly elevated temperature found in the mouths of those who had dental caries over a long period. In such cases the mouth temperature should be disregarded and the rectal temperature employed.

DR. FRITZ B. TALBOT, of Boston, said Dr. Abt had spoken of a case of tetany having poorly developed teeth. The recent work of Howland on the blood calcium showed that the blood contained a diminished amount of calcium during the acute stages of certain diseases. There was a direct relation between the teeth and digestion, and there was scientific proof that the digestion had a great deal to do with the teeth.

DR. E. C. FLEISCHNER, of San Francisco, suggested the axiom, "Every tooth is either good enough to fill or poor enough to pull." A carious tooth corresponded to a sequestrum of bone in another part of the body and should be treated on the same principles as such a sequestrum would be treated.

THE COAGULATION TIME OF THE BLOOD IN THE NEW BORN WITH SPECIAL REFERENCE TO CEREBRAL HEMORRHAGE

DR. FREDERICK C. RODDA, of Minneapolis, stated that his interest in this subject had been aroused by autopsy findings. In the post mortem examination of infants dying of cerebral hemorrhage over 50 per cent. had been found to follow non-instrumental deliveries and many followed normal and easy births. In these cases, the blood was found slightly or not at all coagulated. He had also been struck by the fact that cerebral hemorrhage was by far the most frequent cause of death in the new born. In many cases at post mortem, no torn veins were found in the cerebrum or

cerebellum to account for the hemorrhage, and multiple hemorrhages were found in portions of the body where it was inconceivable that they could be explained by trauma. Over 25 per cent. of all infants dying of cerebral hemorrhage showed this picture of multiple hemorrhages. An analysis of cases reported in the literature deepened the conclusion that these hemorrhages were due to factors other than trauma. Further study led to the conclusion that there was a disturbance in the coagulation time of the blood in the new born. It was found that the average coagulation time in the new-born was 7 minutes. In icterus, melena, jaundice, syphilis, and nontraumatic cerebral hemorrhage, the coagulation time of the blood was prolonged. In melena it might be delayed to 90 minutes. The subcutaneous injection of normal blood was effective in cases in which there was delayed or slow bleeding. A careful study of the blood and spinal fluid was made in cerebral hemorrhage. In one case cited it was found that the average clotting time was 13 minutes; on the first day it arose to 90 minutes and after transfusion dropped to 11 minutes. Where the blood clot could be localized in the brain, as was sometimes possible, operation was justifiable.

Discussion.—DR. ISAAC A. ABT, of Chicago, said they were accustomed to think of cerebral hemorrhage as the result of trauma and frequently the obstetrician was blamed for damage for which he was not responsible. Dr. Rodda had brought out the most frequent cause, and the reasons for it. This contribution to their knowledge should be helpful in the clinical management of these cases. It showed the importance of ascertaining the coagulation time of the blood in babies that showed a tendency to bleed. If one could detect oozing by estimating the coagulation time of the blood, extensive hemorrhage into the meninges might be prevented in many instances. If one recognized that there was slow oozing into the subdural or subarachnoid space, an injection of blood might be made into the muscles or a transfusion into the longitudinal sinus. Another point of importance was that surgery in some cases was successful, and when one considered the severity of these cases, if the seat of the hemorrhage was localized, it was quite possible that surgical interference was justifiable, if not indicated. If nothing else was done a decompression to relieve the pressure on the cortex might be advisable.

DR. JOHN A. FOOTE, of Washington, D. C., considered this

work of Dr. Rodda's of great importance and particularly so when one took into consideration the influence of infant mortality at the time of birth on the general infant mortality rate, and the fact that 50 per cent. of the infant deaths during the first month of life occurred during the first 2 days of life. The condition described by Dr. Rodda was found in a large number of cases in routine autopsies where no symptoms had been present so that a standard and rapid method for obtaining the coagulation time of the blood would be very useful. He had found it necessary in some cases to use thromboplastin and he had used blood transfusion with good results.

Dr. H. B. Hamilton, of Omaha, Neb., said it had been his good fortune to see some of Dr. Rodda's work and he felt that it would be a great aid not only in reducing infant mortality but in lessening the morbidity, the physical deformities and perhaps the deformities of mental and moral character that followed a failure to recognize and treat these cases of cerebral hemorrhage. In cases associated with intracranial pressure it might be necessary to resort to extreme measures. If the hemorrhage was localized he thought it was sometimes justifiable to operate. Some one had suggested repeated lumbar punctures where the hemorrhage was localized and the question of opening the cisterna magna had been discussed. This he felt was rather a formidable procedure, but possibly even an unsuccessful operation was preferable to the condition in which some of these children had to live.

Dr. Rodda, in closing, again emphasized the frequency with which cerebral hemorrhage occurred and the difficulty of explaining it where labor had been normal. Lumbar puncture might give good results if the bleeding occurred below the infratentorium. In discussing the possible causes of delayed bleeding, he said it had been noticed in taking blood for the purpose of estimating the coagulation time, that if the little clot that formed after the withdrawal of blood was brushed off fresh bleeding occurred; it was possible that after such a small clot had formed in the brain of an infant crying or vomiting might dislodge the small clot and start fresh bleeding. Surgery to be effective should be done early and before it was undertaken a transfusion should be done. If, however, operation had been delayed for 14 days it was not necessary to give a transfusion.

THE ANTISCORBUTIC VALUE OF PROPRIETARY
BABY FOODS.

DR. JOSIAH J. MOORE, of Chicago, described feeding experiments with white mice and guinea pigs in which various proprietary infant foods were employed. The proprietary foods were divided into 2 groups, namely, those that were supposed to be complete foods without the admixture of milk, and those to which cows' milk was added. Certain of these foods were found sufficient for the maintenance of white mice, but were inadequate in antiscorbutic properties when fed to guinea pigs. Frequently the animals gained rapidly for a short time but they all developed scurvy later. The only difference noted between the foods that were modified with milk and those to which no milk was added was that scurvy appeared earlier when the latter class of foods were used but they all eventually succumbed. It was observed that the foods modified with milk induced more rapid growth than those not thus modified. It was also found that normal adult guinea pigs did not develop scurvy on these diets as soon as did young, growing animals. It might be argued that the findings in guinea pigs did not form a criterion as to what would happen in the human infant, for it was known that the guinea pig required more antiscorbutic food than the infant, but the experiments were suggestive and confirmed the findings of other investigators as to the need of antiscorbutic food for infants. All infants receiving proprietary foods, whether or not modified by the addition of cows' milk, should receive an antiscorbutic.

Discussion.—DR. JULIUS H. HESS, of Chicago, said he had had occasion to follow some of Dr. Moore's work and he regretted that one part of the work was not sufficiently near completion to be reported. He had been verifying some of the work done by Dr. Hess of New York. The work was done on guinea pigs, though this animal was far from ideal and the results could not be definitely compared with the results in the human. Unless the guinea pig was fed considerable roughage it had intestinal stasis and this had a profound influence on scurvy; then, too, the guinea pig was very susceptible to infection. In the foods not containing milk the shortage was not in one only but in several elements and unless milk was added they were by no means complete

foods. Manufacturers knew this and these foods were not put on the market as complete foods, but most of them while calling for the addition of milk did not advise the addition of sufficient milk and did not make provision for an adequate amount of antiscorbutic food to guard against the milder forms of scurvy. Antiscorbutics should be given to infants earlier than most writers advised, and if a proprietary food was used the child was susceptible to scurvy much earlier than if cows' milk were fed.

STUDIES OF THE EFFECT OF DIPHTHERIA TOXIN ON THE HEART

DR. HUGH McCULLOUGH, of St. Louis, said it was a well recognized fact that during the course of infectious disease in childhood certain changes in the heart muscles occurred, due to the action of toxins. Diphtheria toxin acted on highly specialized tissue in the body, producing parenchymatous degeneration with secondary interstitial changes. A very important effect was on the heart muscle. This action was not a local infection, but an action of toxins on the muscle cells. Occasionally at autopsy they found a case in which these changes in the heart muscle could not be demonstrated and yet these children during life had shown the signs of myocarditis. They felt that in such cases functional changes must be responsible for the acute cardiac failure, breathlessness, and cyanosis which was observed. A study of this question led to the conclusion that the effect of the toxin might be on the whole heart muscle or on the structures controlling the rate and propagation of the impulse from auricle to ventricle and through the walls of the ventricles. Experiments had been carried out on animals to show the effect on the heart under such conditions and electrocardiographic tracings had been made. The conductivity might be interfered with at any point along the path of the impulse, giving rise to auricular flutter, paroxysmal tachycardia, or ventral fibrillation. The electrocardiographs frequently showed a change in the ventricular complex. The essayist presented an analysis of a series of 80 cases. Those cases, in which the muscle alone showed changes, might recover provided the cardiac reserve was preserved. It seemed that functional changes rather than organic were responsible for some of

the cardiac conditions seen in diphtheria, and it seemed altogether probable that these conditions led to chronic cardiac disease subsequently in life.

Discussion.—DR. FREDERICK C. RODDA, of Minneapolis, emphasized the point that it was the diminution of the cardiac reserve that was responsible for the fatal ending in so many of these cases. He felt that the application of the electrocardiograph to the study of cardiac disease in children would show a great deal in the future with relation to heart disease due to other causes than diphtheria.

INTRAMUSCULAR BLOOD INJECTIONS AS NUTRITIONAL AIDS

DR. THOMAS D. PARKE, of Birmingham, Ala., reported 4 cases of ileocolitis in which nourishment and even water could not be retained when given by mouth. These cases were treated by hypodermoclysis and intramuscular injections of citrated blood administered daily, the average injection being 10 c.c. of blood. Although these cases were too few to warrant definite statements he felt that the blood injections had been responsible for tiding these children over a critical period until feeding by mouth could be resumed. Where many injections had to be given it was sometimes difficult to find a muscle. He had made injections into the pectorals, the hamstring muscles and the gastrocnemius. Fifty c.c. was the largest amount given at 1 injection.

Discussion.—DR. FRITZ B. TALBOT, of Boston, said it was well to bear in mind that there were a great many things that played a part in the recovery of a child. Among these was the fluid intake and output of the body. The fluid output in cases of diarrhea was extraordinarily great. It was surprising how much could be lost in 24 hours and if nothing was going into the body a great deal of tissue was being lost. Great emphasis should be placed upon giving enough liquid in these cases to maintain the body.

LOCAL ANESTHESIA IN INFANCY AND CHILDHOOD

DR. ROBERT E. FARR, of Minneapolis, presented this contribution which was illustrated with lantern slides. He said he thought

it was quite generally known and appreciated that novocaine was the safest anesthetic known, therefore if one could use novocaine he would not use a more dangerous drug. It was also known that many children were in a bad condition following the use of a general anesthetic and that the anesthetic often decided the issue. The psychological effect did not play as important a part in local anesthesia in children as it did in adults. The illustrations showed how the child could be restrained on an arm table set at right angles to the operating table.

The child's feet were attached by bandages to the operating table and the nurse held the arms above the elbow. In this way children even several years old could be held quite well. As a rule the child needed restraint only while the anesthetic was being given. They had been doing many different kinds of operations under anesthesia. Recently they had been using local anesthesia in operating for harelip and for abdominal operations. The apparatus for giving the local anesthesia was very simple. They were always prepared to reinforce the local anesthesia with general anesthesia but it was rarely necessary to do this. The infiltration was made beneath the skin and when the reflexes were abolished abdominal operations could be performed without extrusion of the viscera, and was particularly applicable to operations for hypertrophic pyloric stenosis. If there was pain, the procedure could not be called anesthesia. Dr. Farr reported a series of 129 cases of children, operated under local anesthesia, and in only 9 was there any pain, and when this occurred it was due to an error in technic. The operation for hypertrophic pyloric stenosis could be done under local anesthesia in 12, 15 or 18 minutes, and with the danger of a general anesthetic eliminated it was possible that borderline cases might come earlier to operation. The solution used was a 0.6 per cent. to 1 per cent. novocaine in Ringer's solution.

Discussion.—DR. MARTIN B. TINKER, of Ithaca, N. Y., expressed the opinion that local anesthesia in children was a life-saving procedure. The point to be emphasized was that any local anesthesia, that was not satisfactory to the patient, was not local anesthesia. If the child struggled and cried that was not anesthesia at all. It was understood that a general anesthesia should be given at any time if the local anesthesia was not satis-

factory. Another advantage in the use of a local anesthesia was that the surgeon was more likely to handle the tissues gently and that was even more important in children than in adults. In hypertrophic pyloric stenosis, Dr. Bevan and other surgeons in the surgical section had favored the use of local anesthesia, and thought that a general anesthetic should not be used in these cases. Still another point in favor of local anesthesia was the loss of blood was less than with general anesthesia. Local anesthesia was unquestionably the anesthesia of choice, if the child was not of the nervous type, but in children from 2 to 7 years of age, who were nervous, there might be some question whether the shock from the local anesthesia was not greater than from a general anesthetic. However, as a rule, the nervous shock was greater from general than from local anesthesia.

GONOCOCCUS VULVITIS IN LITTLE GIRLS (Pediatria, Naples, May, 1919, p. 257). S. Maggiore reports seven cases to illustrate the advantages of treatment of infantile gonococcus vulvovaginitis with tannic acid in powder form. The secretions in the vulva and at the opening of the vagina are washed off under a stream of 1 per twenty thousand solution of potassium permanganate, without pressure, and the parts are dried with cotton. Then they are dusted with a thick layer of tannic acid and a small pad of cotton is applied and held with a bandage. Each time the child urinates the powder is applied anew. It sticks long to the tissues and exerts a mild antiseptic action. The results have been very encouraging in his experience, the most rebellious forms of the vulvitis soon healing under this treatment. The children were from 5 to 10 years old and the disease was of one or two weeks' standing, and recovery was complete in from one to three weeks at most. This technic requires less manipulations than with fluids.
—*Journal A. M. A.*

BOOK REVIEW

THE PROBLEM OF THE NERVOUS CHILD. BY ELIDA EVANS.
Introduction by C. G. JUNG, M.D., L.L.D., New York.
Dodd, Mead & Company, 1920.

This interesting little book by a lay woman should be read by all pediatricists and by most physicians. It is written in such an entertaining style that one learns without being conscious of so doing, so much so that one puts it down with regret. We, as physicians, and those of us who are interested in the mental hygiene of the child and in neuroses in adults, realize that a great many of the abnormal mental conditions which we encounter owe their origin to early impressions in childhood. It is equally important for us as physicians, to realize the vast importance of the parent's mental attitude toward, and its result on the psychology of the child. Too little attention has been paid, in the past and at the present time, to the mental hygiene of the child and adolescent. Parents have not been enlightened. Too little time has been spent on teaching the importance of the sexual instinct, and indeed the physician is usually to blame for this state of affairs. In addition, the proper psychological environment and attitude of many children has not been determined. This wrong psychological position, which is at the bottom of almost every neurosis, has, as a rule, been built up during adolescence, and begun in early childhood as a consequence of incompatible familial influences. Mrs. Evans in this book more than fully covers the field. Of particular interest to the reviewer were the chapters on "The Parent Complex"; "Child Training"; "Teaching of Right and Wrong"; and "Self and Character." It is a well printed and well bound book of 300 pages with a very complete index. Illustrative cases are given for most of the conditions. It is well worth while.

ARCHIVES OF PEDIATRICS

JULY, 1920

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SOCIETY REPORT

THE AMERICAN PEDIATRIC SOCIETY

THIRTY-SECOND ANNUAL MEETING, HELD AT
HIGHLAND PARK, ILL., MAY 31, JUNE 1 AND 2, 1920.*

THE PRESIDENT, DR. THOMAS S. SOUTHWORTH OF NEW YORK,
IN THE CHAIR.

SEGREGATION OF PNEUMONIA

DR. THOMAS S. SOUTHWORTH, of New York, after expressing his appreciation of the honor conferred upon him in his election to the presidency of the American Pediatric Society, paid a tribute to the memory of Dr. Abraham Jacobi, who had been twice president of the Society. He said it would have been Dr. Jacobi's dearest wish, as indeed of every great teacher, that the torch which he relinquished should be caught up and carried to still greater heights by younger men. He also recalled the

*Detailed report especially made for Archives of Pediatrics.

work of Dr. Floyd M. Crandall, who was at one time a member of the council of the Society, and recommended the appointment of a committee to frame a fitting memorial to these men.

In speaking of the segregation of pneumonia, Dr. Southworth said that more and more attention was being paid to the prevention of infectious diseases, especially such as bore particularly on the child. Here adequate separation of the sick from the well was indispensable, and the principle was capable not only of stricter enforcement, as in rural communities, but of intelligent extension everywhere into new fields. One of these was pneumonia, which today was one of the great endemic plagues of the world, for which less had been accomplished in the way of limiting its ravages than for any other malady of like import save pandemic influenza. This was not due to lack of interest in the problem but rather to its complications, since the processes as we called pneumonia were several pathologic entities of diverse etiology, and with somewhat loosely correlated clinical manifestations. Untiring zeal had been expended to find a remedy for the pneumonias, but they had not considered so clearly the possibility of guarding against their inception. Here the field was a wide one worthy of further patient study. There was one avenue not properly guarded and that was the exposure of susceptible individuals in dangerous propinquity to active cases of the disease.

We had in the pneumonias processes caused by the presence of microorganisms of recognized pathogenic virulence, yet it had long been their custom to treat pneumonias in the general wards of hospitals, and to place about them in the home only the ordinary precautions of the sick room. Segregation of such cases might have been practiced by thoughtful individuals, but the idea had not found its way into the general medical conscience nor been advocated widely in our literature. Evidence of the infectiousness of pneumonia was not wanting. Whenever it appeared among children, quarantined for measles, it spread rapidly with an appalling mortality. He had therefore for years insisted, when possible, upon the prompt isolation of the first cases of pneumonia among children having measles with a resulting limitation of the number of cases, and had extended segregation to all the pneumonias.

The real question was not whether the case for the individual

infectiousness of the pneumonias was fully proven to the satisfaction of the most skeptical, but whether we were individually to assume responsibility for permitting exposure of cases of pneumonia which we would not permit to many types of much less serious illness, the latter having been declared quarantinable while the pneumonias thus far had not been. The obligation was imperative to anticipate the day, not far distant, when the movement to control the scourge of pneumonia might make the retention of such cases in a general ward as repugnant to our medical sense of propriety as the retention of a case of open pulmonary tuberculosis.

STUDIES ON BLOOD SUGAR: THE EFFECT OF BLOOD
ON PICRATE SOLUTIONS. A CONSIDERATION
OF THE LIMITATIONS OF THE LEWIS-
BENEDICT TEST.

DR. DAVID MURRAY COWIE, and DR. JOHN PURL PARSONS, of Ann Arbor, reported a series of experiments which tended to show that blood contained substances other than sugar which induced a color change in the picrate solution employed in the modified Lewis-Benedict blood sugar method. Under normal conditions these substances did not interfere with the established normal range for this method. Under pathological conditions several of these substances which showed the most marked influence were epinephrin, acetone and diacetic acid. Creatinin might interfere but did so in a less marked degree if we considered the comparative sensitiveness of the picrate solution to these substances.

As picrate solution reacted to smaller quantities of acetone than were normally found in the blood, the question might well be raised: "Do not the acetone bodies of the blood contribute to the established normal blood sugar range for the Lewis-Benedict test?" Still another question might be asked: "As epinephrin in infinitesimally small quantities induces a color change in picrate solution, is it not possible that this substance, when thrown into the general circulation, as is supposed to happen in emotional states, may induce a so-called hyperglycemia without mobilizing the glycogen stores of the liver?"

Discussion.—DR. OSCAR M. SCHLOSS, of New York, said it

seemed probable that under normal conditions the Lewis-Benedict method was an essentially accurate clinical method, though it had a moderate error such as was present in any colorimetric method. He had run a series of observations using the Lewis-Benedict method and a control series in which the method of Bertrand was used. It was quite true the Lewis-Benedict method gave results that were constantly higher, but the difference was consistent and did not influence the results of observations made in normal cases. It was quite true, however, that a marked increase in creatinin would influence the results. The relationship of acetone and adrenalin were quite interesting and should require careful tests of the accuracy of this method.

EPIDEMIC ENCEPHALITIS LETHARGICA.

DR. LINNAEUS E. LAFÉTRA, of New York, stated that cases of a disease accompanied by profound somnolence and lethargy had occurred at various times in sufficient number to have been regarded as epidemics. It was evident both from the difference in the lesions and also from the results of animal experimentation that poliomyelitis and epidemic encephalitis were distinct diseases. He had not found that it followed influenza with sufficient regularity to warrant one in stating that it was caused by influenza, though influenza might possibly predispose the patient to infection or increase the virulence of the prevalent virus.

Loewe stated that he had obtained organisms from the brain, the spinal fluid, the nasal washings and twice from the blood of encephalitic patients which he believed were the cause of the disease. Dr. Loewe and Dr. Strauss had made an exceedingly careful study and their conclusions were: 1. That the virus of epidemic encephalitis could be maintained by regular rabbit passages. That it became a fixed virus, killing the animal on the fourth, fifth or sixth day, with symptoms of torpor, myoclonia, meningeal irritation, fleeting epileptiform convulsions, rigidity and typical lesions. After many passages (7) through this species of animal it became pathogenic for catarrhine monkeys. 2. The virus was not cultivatable by the usual methods. 3. It could be preserved in glycerol. 4. It was a filterable virus. It passed with facility through Chamberland filters 1 and 3. 5. It could be inoculated into the rabbit either by the intracerebellar route

or by way of the peripheral nerves. . Subcutaneous inoculation had no effect.

Dr LeFétra said his own cases, 11 in number, had all been seen at Bellevue Hospital since January 1st. Of the 11 cases, 4 had died. Two of the children were 5 years old, one 7, four 8, three 10, and one 12 years. There was no relationship between any 2 of the patients and they did not live in close proximity to each other. In only 2 was there any history of influenza. The symptoms were varied, but in most instances there was marked headache accompanied occasionally by dizziness. Vomiting occurred in about one-half of the cases. Pain in the eyes and cheeks compelling drowsiness was present in most of the cases. Two children were very wakeful and talkative for a day or two and then became lethargic. In 1 case, there was sleeplessness for 56 hours. When the disease was well under way the outstanding features were lethargy, general weakness and ptosis or paralysis of the ocular or facial muscles, with double vision in several instances. Fever was usually very slight, from 101° to 102° F., and that for only a few days. Weakness of the muscles of the face gave the mask-like appearance. The muscles of the extremities had a peculiar wax-like tone and the limbs remained in the position in which they were placed. Three cases were so lethargic and weak that they had to be fed by tube; the other 8 could be aroused and answered questions. The response would come, however, after very long latent periods, so it might be thought the question was not heard. It was noted that the fatal cases had higher white cell counts than those that recovered. The spinal fluid was under little or no increased pressure, and in some instances was perfectly normal, there being no increase in the number of cells. In most cases, however, globulin was present and there was an increase in the number of cells. The highest number of cells found was 275 in a fatal case. The average number ranged from 50 to 100, all of which were mononuclears. The fluid was sterile on culture. The chloride of gold test was negative.

Recovery took place gradually, there being first a return to consciousness, then a diminution of catatonia and paralysis, and last of all the asthenia and ptosis disappeared. Two patients showed serious sequelae, one imbecility and the other spastic paralysis and mental impairment. Undoubtedly, as with poliomy-

yelitis, abortive, mild atypical cases of the disease occurred, many of these probably being unrecognized. The disease had to be differentiated from tuberculous meningitis, poliomyelitis, cerebrospinal syphilis, brain tumor and meningism. From tuberculous meningitis it was differentiated by the high cell count in the latter and by finding the tubercle bacilli. The course in tuberculous meningitis was 2 or 3 weeks while in encephalitis lethargica it was longer. In encephalitis, ptosis and facial palsy appeared early and did not progress. In differentiating the disease from poliomyelitis, one must be guided by epidemiology. Poliomyelitis was more apt to occur late in the summer and in the fall and the cell counts in the spinal fluid were higher, and there was a larger percentage of polymorphonuclears. In encephalitis, the cells were practically all mononuclears. However, that point was not absolutely diagnostic. From cerebrospinal syphilis the disease could be differentiated by the negative Wassermann and negative gold chloride tests; from brain tumor, by the absence of choked disc and changes in the spinal fluid; from meningism, by the absence of other disease that would cause meningism. Meningism was likely to give an increased spinal fluid with normal findings. The mortality of the disease was about the same as that of poliomyelitis. How great a proportion might later show damage to the brain it was too soon to state. The treatment, until a specific serum was produced, was symptomatic.

ACUTE CEREBRO-CEREBELLAR ATAXIA, WITH REPORTS OF CASES.

DR. J. P. CROZER GRIFFITH, of Philadelphia, presented 3 new cases of encephalitis and a résumé of a case previously reported, all of them pointing to an involvement of the cerebellum as well as the other parts of the brain. The first case exhibited incoördination, nystagmus, affection of speech, confusion of mind, increased knee jerks, but no paralysis. This patient made a rapid and complete recovery. The second case exhibited a staggering gait, dizziness, incoördination, no nystagmus or affection of speech. This child showed some incoördination $3\frac{3}{4}$ years later. The third case had a staggering gait, strabismus, nystagmus, vertigo, mental backwardness, affection of speech; normal eye-grounds. A year later the symptoms were still present but im-

proved. The fourth case exhibited early symptoms suggesting encephalitis lethargica. During improvement marked incoördination and affection of the speech became manifest. Recovery was very slow. At last report the slow speech still persisted.

The conclusion to be derived from these cases, and from 17 cases previously collected from the literature was that this was a condition not common but still certainly more frequent than ordinarily supposed, in which acute hemorrhagic encephalitis involved the cerebellum, and which might be designated "acute cerebellar encephalitis." With this disease there were always combined symptoms indicating an involvement of the large brain as well, and for these the title cerebro-cerebellar encephalitis or cerebro—or cerebro-cerebello bulbar encephalitis was to be preferred. The degree to which the process involved one or another part of the brain varied with the cases, but in all there was a combination of the symptoms affecting both regions. The cause of cerebro-cerebellar encephalitis varied decidedly. In the majority of cases previously reported, some infectious disease had preceded the attack. This was true in 2 of the cases reported in the paper; in the other 2, no such connection could be discovered. The symptoms were those mentioned in the cases cited. The prognosis so far as life was concerned seemed good. That clinical evidence of the disease would not persist was uncertain, but so far as statistics went it would appear that the disease would leave no traces in the majority of instances. Lumbar puncture was done in all the cases reported by the writer and was always negative.

THE SIGNIFICANCE OF XANTHOCHROMIA OF THE CEREBROSPINAL FLUID, WITH REPORT OF A CASE IN A PREMATURE INFANT.

DR. ISAAC A. ABT, of Chicago, said this case was reported because of the yellow coloration of the spinal and ventricular fluid. The infant was 37 days old at the time of death and was of 8 months gestation. Interest also attached to this case because of the occurrence of bronchopneumonia and pyelitis.

Xanthochromia was found in the complete syndrome of Froin and in the incomplete syndrome of Nonne. Froin's syndrome included massive coagulation, while Nonne's syndrome included

increased globulins, but not massive coagulation. The importance of cell increase was mentioned by some and ignored by others.

Considering xanthochromia or yellow color by itself is the simplest way of elucidating the subject. It was most frequently found in cases of tumor, inflammation or trauma cutting off part of the spinal canal. The cul-de-sac so formed usually contained a yellow fluid which coagulated en masse. The pigment comes from the blood ultimately. In addition to the process of transudation, which occurred in a cord compression, it was readily seen that any condition which permitted red blood cells to escape into the spinal fluid might produce a yellow color when the red cells had been dissolved and the hemoglobin freed.

The globulins were always increased in a yellow fluid, whether massive coagulation occurred or not. It might be due to transudate in the case of a tumor pressing on the cord; exudate in the case of a meningeal inflammation, and hemorrhage in cases due to trauma, inflammations and tumors.

Increased cell count occurred in cases of meningitis and was also found in cases of tumor and hemorrhage. In the last case, the presence of red cells usually excluded other conditions, although blood might be present as a concomitant finding in tumors and meningitis.

Pellicle formation was of little importance, was usually found in meningitis, and had been reported in a case of tumor without meningitis.

Where the process had been of short duration and where the compressions have not been sufficient, massive coagulation might not occur. In fact, many writers stated that Nonne's complete syndrome was merely a precursor of Froin's complete syndrome. Some cases of Nonne's syndrome probably never reached Froin's stage. Similarly, conditions causing hemorrhage might never give sufficient plasma and fibrin to cause coagulation.

Another class of cases causing a yellow spinal fluid was that type associated with red cells in the fluid. Many considered this a separate syndrome, and applied the name erythrochromia to this condition. It was shown by quotations from the literature that no hard and fast line could be drawn between yellow fluid on the basis of the presence of red cells. The other differences which were stated as distinguishing erythrochromia from xanthochromia were proved to be not differences at all, because such

properties of variability of a single fluid as regards color and globulin content applied just as much to one as to the other.

The case reported was that of a child brought to the hospital as a feeding case. About the fourteenth day the temperature rose to 106°F. and the child was seized with severe convulsions. The urine showed pyelitis, and, upon examining the lungs, patches of bronchopneumonia were found. The convulsions, urinary and pulmonary findings persisted until the end. The anterior fontanel was tense and bulging. On the thirtieth day, spinal puncture yielded 4 c.c. of distinctly yellow fluid. The fluid was clear but the first 2 c.c. yielded a filmy pellicle. The second tube, containing 2 c.c., did not change. Three days later, the right ventricle was punctured and 20 c.c. of yellow fluid was removed. In both specimens of fluid there were red cells, increased globulin, and increased cell count, most of which were polymorphonuclears. The child died on the thirty-seventh day and autopsy showed a fibrinous, hemorrhagic meningitis and encephalitis. There were sub-pial hemorrhages, marked internal hydrocephalus, sub-acute pyelitis, and bronchopneumonia.

Two other cases were quoted from the literature in which ventricular punctures were performed. In one of these, the fluid was yellow and the condition was due to a tumor of the pineal gland. In the other, the fluid was colorless, and the yellow color of the spinal fluid was due to a tuberculosis mass at the foramen magnum. Previous to this case, the youngest case on record of xanthochromia of the cerebrospinal fluid occurred in an infant of 9 months. This case was one illustrating the second type of xanthochromia. Both the spinal and the ventricular fluids were yellow and both contained red blood cells. It should be noted also that the infant was an infant of 8 months gestation, who lived 37 days, and who also had bronchopneumonia and pyelitis.

NATURE OF THE REDUCING SUBSTANCE IN THE URINE OF CHILDREN SUFFERING FROM NUTRITIONAL DISORDERS.

DR. OSCAR M. SCHLOSS, of New York, said that the work of Langstein and Steinmetz had led them to believe that this reducing substance was lactose or galactose. Experiments which he had carried out did not confirm this finding. The only reducing substance which he had found constantly present in perceptible

amounts was glucose. There was usually a non-fermentable reducing substance similar to that found in normal urine. This might be lactose, but its amount was too small to identify it with certainty.

Discussion.—DR. DAVID MURRAY COWIE, of Ann Arbor, asked whether in these cases in which Dr. Schloss did not find a fermenting substance like glucose or lactose, he ran an acetone test?

DR. HENRY HEIMAN, of New York, asked whether any attempt had been made to exclude glucose and then to test for pentose and galactose.

DR. SCHLOSS, replying to Dr. Cowie, said the acetone and the creatinin would of course be present in the non-fermentable fraction. Both substances were excluded, the acetone by boiling the urine and the creatinin by first precipitating with mercuric nitrate solution. If pentose was present, it could only be present in the non-fermentable fraction. The proportion was so small it was difficult to determine its presence with any degree of certainty.

BODILY MECHANICS: ITS RELATION TO CYCLIC VOMITING AND OTHER OBSCURE INTESTINAL CONDITIONS.

DR. FRITZ B. TALBOT and DR. LLOYD T. BROWN, of Boston, stated that faulty bodily mechanics was responsible for a great loss of efficiency among adults during the war. Many men broke down in France under the strain of training and war. The large numbers could not be sent home and were therefore given special physical training. This brought back 80 per cent. to full physical efficiency. There was a great shortage of man power in England and it was found that about one-sixth of the men were physically unfit. The lack of proper education during the growing and formative periods of these men's lives not only cost the British Government a great deal of money but also much anxiety as to how to obtain the necessary amount of man power.

Poor bodily mechanics were more easily prevented and corrected in childhood than adult life and time spent on training at this age brought more far reaching results than the same time spent on adults. There were 3 abnormal conditions which came in childhood with poor bodily mechanics that were so frequently relieved by correcting the posture that posture must be the prin-

cial cause, or the principal contributing cause of these conditions, granting that all other causes were ruled out. Correcting improper posture often corrected chronic constipation, hastened the cure of recurrent vomiting, and the cure of certain types of attacks of acute abdominal pain in children.

Discussion.—DR. CHARLES GILMORE KERLEY, of New York, asked Dr. Talbot if he had made an x-ray study of the intestinal tract of any of these children. He had been studying along the same line and had found practically the same things true except that he had always attributed the faulty posture and distension of the abdomen primarily to a defect in the intestinal tract. In these cases one almost invariably found an elongated sigmoid. Associated with the elongated sigmoid and faulty posture one found all sorts of intestinal disturbances. It was remarkable what an abdominal support would do for these cases. It seemed to him that it was the faulty structural conditions rather than faulty mechanics that was the primary cause of the trouble.

DR. TALBOT, in closing the discussion, said they had had x-rays of the intestinal tract taken in most cases and had found a number with elongated colons. It had been shown that in some cases, if the child was lying down, the x-ray showed almost nothing, but if the child stood up there would be a great deal of ptosis. The same individual might assume both a good posture and a poor one, and it might happen that the transverse colon was 5 inches higher during good posture than when the poor posture was assumed. There was no question but that there was a great variability in the intestinal tract in different individuals. The most important thing in these cases was to keep the child in one's own hands and guide the treatment. The next most important thing was to prevent fatigue. Fatigue caused a poor posture and poor posture caused fatigue. The belt alone did not do everything. With the best there must be proper curative exercises, and these latter were a very essential part of the treatment.

A BRIEF CASE REPORT ON AN EPIDEMIC OF HEMORRHAGIC DIARRHEA DUE TO THE STREPTOCOCCUS MUCOSUS.

DR. A. D. BLACKADER, of Montreal, said he was summoned to Waterloo, 60 miles southeast of Montreal, because of an epi-

demic of diarrhea. The first case occurred on March 22, 5 on the following day, and since then the number had increased to 65 in the town itself and there were other cases within a short radius. Adults composed about one-fourth of the entire number. The larger proportion, however, were children under the age of 6 years. The attack began abruptly with high fever, nervous symptoms, vomiting, and diarrhea set in early. Mucus and blood appeared in the stools and the amount increased rapidly as the stools became more frequent, and in the severe cases seemed to form almost all of the stool. Blood was a prominent feature in the stools in 60 per cent. of the cases. The attack lasted from a few days to 12 to 14 or even to 21 days. The temperature in the severe cases went as high as 106° F., while in the milder cases it was comparatively low, 100° or 102° F. In a few cases, there was no rise above normal. Notwithstanding the severity of the cases no deaths occurred. Examination of the stools in one case showed large numbers of chains of streptococcus encapsulatus, and about an equal number of colon bacilli. There were very few other bacteria. There were no organisms of any of the types of bacillus dysenteriae. In a second case examined, there were large numbers of streptococcus mucosus. It was unfortunate that bacteriological examination of the stools was not carried out in a larger number of these cases as he had hoped it would be.

In searching for the origin of this epidemic an inspection was made of the milk supply, but a careful study of the situation seemed to eliminate the milk as a source of infection. The water supply came from springs and several of these were thought to be insufficiently protected against contamination. The epidemic occurred after a few days of pronounced warm weather when the snows melted rapidly on a still frozen soil. The presence of such large numbers of streptococcus mucosus, associated with other streptococci and of equal numbers of colon bacilli, and the absence of any bacillus dysenteriae indicated that the streptococcus must be regarded as the chief organism in the production of the epidemic.

PHLYCTENULAR OPHTHALMIA AND ITS RELATION TO TUBERCULOSIS.

DR. BORDER S. VEEDER and DR. T. C. HEMPELMANN, of St.

Louis, presented this study which was read by Dr. Hempelmann. He stated that there was a widespread impression among pediatricians that phlyctenular ophthalmia was closely associated in some way with tuberculosis, but many ophthalmologists were as yet unwilling to concede this relationship. In an effort to gather additional clinical evidence on this point, 196 children with phlyctenular disease were subjected to a careful study to determine the possible presence or absence of tuberculous infection. The study revealed an intimate association between the 2 diseases. Skin tuberculin tests were positive in over 92 per cent. of the cases. The results of the complement fixation test for tuberculosis were strikingly similar to those obtained in cases of proved tuberculosis. Tuberculous lesions involving other organs than the eye were definitely demonstrable in over half, and seemed probable in almost two-thirds of the cases. Children observed over periods of 1 year or more showed an even greater proportion of tuberculous lesions, more than four-fifths of this series giving such evidence. Cough, malnutrition and history of exposure to other cases of tuberculosis were frequent. No other points were brought up in the study which would seem to have a bearing on the etiology.

A STUDY OF PNEUMONIA IN INFANTS AND CHILDREN DURING THE RECENT EPIDEMICS.

DR. HENRY HEIMAN, of New York, presented an analysis of 336 cases of pneumonia admitted to the pediatric service of Mt. Sinai Hospital during the pandemic of influenza. Not all of these cases were influenza pneumonias. There were 288 bronchial pneumonias and 48 lobar. The mortality was 16.6 per cent. With the exception of the 2 to 5 year period the mortality varied inversely as to age. A variety of organisms were found in the sputum, including the influenza bacilli, pneumococci, streptococci, staphylococci, but none in sufficient predominance to justify conclusions.

The x-ray was found to be of valuable assistance in the diagnosis of both types of pneumonia. The most frequent complication was otitis media, which occurred in 75 of the 336 cases. Empyema developed in 17 cases. When this complication occurred, he ad-

vised against early operation before the acute stage of the pneumonia process had subsided.

Of prime importance in the treatment of pneumonia in children were hygienic care and efficient nursing, a bright sunny room and an abundance of fresh air, quiet surroundings and close supervision. Vigilance should be exercised to protect against infection of the eyes, skin and mouth. A cleansing bath should be given each morning as a routine measure. While fresh air was very necessary, the author did not favor the cold air treatment. It was important that the digestive tract should receive the closest attention. Milk of magnesia might be given at night. Aromatic spirits of ammonia might be given. For the moderately severe cases, with high temperature, hydrotherapy might be employed in the form of warm packs. In toxic cases, atropin and adrenalin might be given. The promiscuous use of dry cupping was to be condemned. It might be regarded as a demonstration of spectacular therapeutics of no real value. Dr. Heiman did not recommend the general use of digitalis in children since as a rule the pulse was not lowered or the blood pressure raised by this agent. It was to be hoped that there would be a further differentiation of types of pneumonia of infants and children with the hope of securing specific therapy.

Discussion.—DR. J. P. CROZER GRIFFITH, of Philadelphia, spoke of the difference in different epidemics in different years and in different localities. During 1918 and 1919, in the influenza epidemic which struck them with unusual severity, there was a great deal of pneumonia; but everybody was struck by the fact that the number of children suffering from it was small as compared with the number of adults, and that the disease in them was not nearly as severe. In the last epidemic of influenza in 1919 and 1920, which was much less severe, he had been impressed with the large number of cases of pneumonia occurring in children as well as by the large percentage which died. This was true both in the wards of the Children's Hospital and in cases seen in consultation in private practice. There was a marked absence of leucocytosis in all of the cases of pneumonia, and the germ most often found was a hemolytic streptococcus. They had noted, too, that it was extremely common to have empyema develop and that it came on very insidiously. Empyema was, indeed, so often present that in cases which ordi-

narily would have been diagnosed as free from this, puncture was done as a precautionary measure, and repeatedly such cases would show fluid.

As to when operation should be done, this was perhaps a surgical matter, yet the question as to whether the child was over its pneumonia was one often put to them, and which repeatedly they had been unable to answer. The cases in the past winter had not shown the usual drop of temperature with subsequent rise, but had developed empyema while the pneumonia was still present.

DR. HEIMAN, in closing the discussion, said it had not been his purpose to give a formula for the treatment of pneumonia. He had simply attempted to generalize, and had suggested remedies that while they might do no good would do no harm. With reference to the high mortality in hospital cases, it must be remembered that there were different strains of organisms, and with some the mortality was higher than with others, and again many of the children that were brought to the hospitals were of low resistance, and consequently the mortality was high. Another reason results were better in private practice was that the cases were treated earlier. Dr. Heiman said he was in favor of fresh air but not cold air and fresh air contained just as much oxygen as cold air. In the application of hydrotherapeutics he never used a cold sponge, and if cold water was not used the child's fear could soon be overcome. He agreed with Dr. Smith as to the advantage of using codein.

FURTHER PROGRESS IN THE STUDY OF THE
RELATIVE EFFICIENCY OF THE DIFFERENT
MERCURIAL PREPARATIONS IN THE TREAT-
MENT OF CONGENITAL SYPHILIS IN
INFANTS AND CHILDREN, AS DE-
TERMINED BY A QUANTITATIVE
ANALYSIS OF THE MERCURY
ELIMINATION IN THE
URINE.

DR. WALTER R. RAMSEY and DR. O. A. GROEBNER, of Minneapolis, presented this study which was read by Dr. Ramsey. He declared that the treatment of syphilis with the different

mercurial preparations was still a haphazard affair, the rule being to give as much mercury as the patient would tolerate without salivation or diarrhea. Assuming that the amount of mercury eliminated in the urine during a given time would give a fair index of the amount in the circulation. Dr. Ramsey and Dr. Ziegler made some experiments, a report of which was read before this society in 1918. In these experiments it was demonstrated that mercury whether given by inunction, by mouth or by hypodermic injection was eliminated in the urine in appreciable amounts. Where only one dose was given by any of these methods mercury continued to be eliminated in the urine for a variable time and in one case as long as 10 days.

In this new series of experiments, they had sought to determine with some degree of accuracy the amount and rapidity of absorption and elimination of the common mercurial preparations in common use as determined by quantitative estimates of the amounts eliminated in the urine. The method was the same as that employed in the previous experiments. It was observed that where 50 per cent. mercurial ointments were used the elimination began soon after administration, the maximum elimination occurring during the following 3 days, the elimination being fairly complete within 5 days. With $33\frac{1}{3}$ per cent. mercurial ointment, even when double the quantity was used, the elimination did not begin in appreciable amounts until the second day after inunction and then in much less quantities than when the 50 per cent. ointment was given. When the mercurial ointment was simply used by smearing on the skin, without rubbing, the amount eliminated was much less than when used as an inunction. In the case of calomel ointment, it would be seen that the elimination was delayed and the total quantity eliminated was much less than with the mercurial ointment although two grams were used for each inunction. With the mercurial salicylate in oil used hypodermically, it would be seen that the maximum elimination was within the first 24 hours, smaller quantities continuing to be eliminated for 6 or 7 days. The mercuric chloride solutions used hypodermically continued to be eliminated in amounts not sufficient to be measured for 6 or 7 days. In 1 case there was an appreciable amount of protein in the urine following its use, a point which was observed in the last publication. Calomel and gray powder by mouth were apparently not absorbed to any

great extent, the calomel being absorbed to a much greater degree than the gray powder. It did not seem to make any difference whether the calomel was given in one or divided doses, the elimination was the same.

The practical deductions which might be drawn from this series of experiments were therefore as follows: 1. Mercurial ointment 50 per cent. was to be preferred to the less concentrated preparations and should be repeated not more often than twice weekly instead of daily. 2. Calomel ointment was absorbed but less rapidly and to a less extent than mercurial ointment and should therefore be given in greater concentration twice weekly. 3. The salicylate of mercury in oil should be given hypodermically twice weekly instead of once. 4. The mercury chloride by hypodermic injection, although the dose was very small, continued to be eliminated for several days, but owing to the fact that its use was frequently followed by the appearance of protein in the urine should exclude it from the treatment of syphilis. 5. Calomel by the mouth was absorbed in small amounts and continued to be eliminated for a considerable time so that it was probable that it would be sufficient to give it at intervals of several days without producing diarrheas. 6. Gray powder was absorbed to a small degree and eliminated rapidly so that fairly large doses repeated daily would probably be necessary to maintain mercury in the circulation. Experiments were being continued to determine, if possible, whether the clinical results would bear out the observations made in this paper. In one case of congenital syphilis treated by inunctions, and not repeated oftener than once weekly, the clinical progress was apparently not less satisfactory than in cases in which daily inunctions were given.

A STUDY OF THE INCIDENCE OF HEREDITARY SYPHILIS.

DR. P. G. JEANS and DR. J. V. COOKE, of St. Louis, made this study aided by a grant from the U. S. Interdepartmental Social Hygiene Board. The method used was the histological examination of a series of placentas, together with a Wassermann reaction on the fetal blood collected from the umbilical cord at birth. In order to determine the reliability of such a method it was necessary to secure additional Wasserman reactions on the mother,

and on the infant, after 2 months, in as many cases as possible. It had been shown that there was a high percentage of agreement between the results of the Wassermann reaction on the maternal blood and histological evidence of syphilis in the placenta. The necropsy findings in still-born infants likewise corresponded closely with the placental histology in so far as syphilis was concerned. The writers had hoped therefore that a similar close agreement could be demonstrated between the placental histology and fetal blood Wassermann on the one hand, and the living infant on the other, in which case the incidence of hereditary syphilis in the middle and upper classes could be estimated by examination of the placenta and cord blood. Their material collected from several sources included about one-fifth of the children born in St. Louis over a period of months, almost equally divided between charity and private patients. The results presented were based on data thus far collected from the first thousand cases. Up to the present time they had examined 129 infants at 2 or more months of age. Of these, 10 per cent. presented undoubted evidence of syphilis, and the remainder were just as evidently non-syphilitic. Classification of this group, according to race, showed an incidence of 15.8 per cent. among negroes and 5.5 per cent. among whites. The histological examination of the placenta as to the presence or absence of syphilitic changes corresponded to the established diagnosis in 95.5 per cent. of the cases. The lack of correspondence consisted entirely in finding no syphilitic changes in the placenta in cases in which the infant had syphilis. In every instance in which the placenta was noted as showing syphilitic changes, the infant was found later to have syphilis. In this group of cases, in which the diagnosis was established, the Wassermann reaction on the placental cord blood corresponded to the diagnosis in the infant in 96.5 per cent. Here also the discrepancies were entirely due to finding of a negative Wassermann reaction in the fetal blood in instances in which the infant was syphilitic. In every instance in which the fetal blood gave a positive Wassermann reaction, the infant was later found to have syphilis. Of the 1000 cases, 574 were of the dispensary or poorer class, and in this group there was an estimated incidence of syphilis in 9.6 per cent. Classified according to race the incidence among negroes was 14.4 per cent. and among the whites 5.8 per cent. The observa-

tions tend to confirm the reliability of the method of estimation and establish the justification of applying either or both methods of estimation. Among private patients, able to pay a physician's fee, and private room rates in a hospital, the estimated incidence, based on examination of placentas, was 1.4 per cent. Including the doubtful cases, the incidence was 1.8 per cent. Estimating the incidence from the Wassermann reaction on the cord blood, the incidence was found to be 1.6 per cent., again showing the close agreement between the two methods. In some instances, in which the infant had syphilis, the maternal Wassermann reaction alone was positive, in others the placenta alone. Therefore, in order to give a clean bill of health to an infant at birth, it was necessary to have all 3 examinations negative that was, maternal Wassermann reaction, placenta, and cord blood and, even then there might be some uncertainty. The fact that the treatment of the mother during pregnancy will result in a non-syphilitic child had been proved by other observations. In this series this observation had been confirmed.

There was an incidence of hereditary syphilis of 5.5 per cent. among the poor of the white race, 16 per cent. among the negroes and 10 per cent. among the whole group of dispensary cases. The incidence among the combined middle and upper social classes was in the neighborhood of 1.5 per cent. The total incidence in the whole series was 6 per cent. It was their feeling that the whole group fairly represented a cross section of the population of St. Louis, and, if such was the case, the incidence of hereditary syphilis at the time of birth was 6 per cent. When syphilitic changes were present in the placenta, the infant was syphilitic even though the Wassermann reaction was negative on the fetal blood, and vice versa, the infant had syphilis if the cord blood showed a positive Wassermann even though the placenta appeared normal. The infant might be syphilitic if both placenta and cord blood were negative. A syphilitic child might be born to a woman with a negative Wassermann, and a mother with untreated syphilis and a strongly positive Wassermann reaction might have a healthy child.

Discussion.—DR. H. J. GERSTENBERGER, of Cleveland, said that in going over their records of 20,000 patients, treated since 1906, they had found an incidence of syphilis of 14 per cent.; the highest percentage of syphilitics was found among poor

whites of American ancestry, the next highest among negroes, the Italians, and the fewest among the Jews. During the last 6 years, they had checked up their clinical diagnosis with the Wassermann test and found very little difference in the incidence as determined clinically alone and since the Wassermann test had been employed. Dr. Gerstenberger recalled one instance in which a woman came with twins 8 weeks old, one of which showed skin symptoms of syphilis while the other was perfectly normal. The Wassermanns corresponded with the clinical picture. Both children were alive and the one that had a negative reaction at that time still had a negative reaction, while the other with the positive reaction was still positive.

DR. HENRY HEIMAN, of New York, asked Dr. Jeans whether he had had any experience with cases of congenital lues subjected to treatment and then a second Wassermann test made. Some had reported that once a Wassermann positive always a Wassermann positive.

DR. LANGLEY PORTER, of San Francisco, said that in a small series of lances tested at the Sloane Maternity they found that unless the blood was heated there was a great deal of difficulty with the anti-complementary properties of the cord blood. They had been able to get data on 118 mothers and babies. They found that $6\frac{1}{2}$ per cent. were luetic taken routinely from the Sloane Maternity without any knowledge of the Wassermann reactions. With one exception, in the luetic cases, the placenta showed changes both grossly and microscopically.

DR. JEANS said any statistics based on clinical examination alone gave a lower incidence of lues than those based on the Wassermann reaction. Dr. Heiman asked whether there could be a serological cure of hereditary syphilis, and whether that would be true of infants and not of older children. They had been getting a negative serological result in every instance in which the child came for treatment for the required time, so that he could say that it was not only possible to get a negative serological result in congenital lues, but that it was the rule under proper treatment. With regard to twins, sometimes one would be positive and sometimes both would be positive. Statistics gave a slight preponderance in favor of both infants being infected. As to the placental blood becoming anti-complementary, they had found

this in so few instances that they had not thought it worth while to report their findings.

PRELIMINARY OBSERVATIONS ON THE PATHOGENICITY FOR MONKEYS OF THE BACILLUS ABORTUS BOVINUS.

DR. E. C. FLEISCHNER and DR. K. F. MEYERS, of San Fran-

cisco, stated that intravenous injections of known strains of bacillus abortus bovinus produced in a monkey a definite symptom complex characterized by irregular temperature, loss of weight and positive agglutination reactions. It was possible to recover the organisms post mortem from the spleen, lymph nodes and kidney of the infected animals. Whereas this type of infection was interesting from the scientific standpoint, it was only by feeding the organisms that deductions could be drawn as to the possible danger entailed when large numbers of these bacteria entered into the intestinal tract. Macacus monkeys were fed daily cultures of known virulent strains over varying periods of time. Agglutination reactions became positive using bacillus abortus as an antigen, and on sacrificing the animal the infecting bacilli were found in the spleen, lymph nodes and kidneys. A goat was infected by injecting into the udder a very virulent strain of B. abortus that had been recently recovered from a hog suffering from abortion disease. The muscles of this goat, which contained about 200,000 bacteria per c.c., were fed to a Macacus monkey for 52 days. Positive agglutination reaction developed and at post mortem the spleen and lymph nodes were enlarged. Enormous numbers of B. abortus were recovered from the viscera. It seemed reasonable to assume that the B. abortus bovinus was pathogenic for monkeys that had been fed virulent strains of the organisms in large numbers.

Dr. Fleischner spoke of the economic side of this question. Abortion disease, he said, was much more prevalent than bovine tuberculosis. For many years there had been a tremendous economic loss because we thought we must eradicate bovine tuberculosis from cattle. He did not want to leave the impression that we must eradicate abortion disease from cattle at the present time.

LESIONS IN THE MID-BRAIN: REPORT OF A CASE.

DR. J. H. M. KNOX, JR., of Baltimore, reviewed the anatomy of the mid-brain, referred to the difficulty of distinguishing between symptoms that might be due to the destruction of nerve tissue by disease and those which were produced by alteration in function in the same area because of the involvement of neighboring structures, and described the syndromes of Weber, Benedict and Nothnagel.

In view of the confusing symptomatology often noted in patients suffering from mid-brain lesion, the case reported in which the symptoms were comparatively definite and the pathological findings fairly circumscribed was of interest. The patient was a colored boy, 3 years of age, brought to the Harriet Lane Home, Johns Hopkins Hospital, February 3, 1915, because of general weakness, trembling, and drooping of the eye-lids. The family and personal history of the patient were negative, the boy appeared perfectly normal until 6 months before admission, when he stopped crying almost completely. About 4 months later, the tremor was noted and a little later the drooping of the eyelids. The outstanding abnormalities revealed by physical examination were some enlargement of the epitrochlear glands and the eye symptoms. The pupils reacted to light but the left better than the right. There was occasional lateral nystagmus of the right eye, marked bilateral ptosis of the eyelids, apparently equal on both sides, and a definite deviation of the eyeball to the right. Two weeks later, the patient returned with the history of having had 2 attacks of paraplegia, having become very weak and limp after the second one. The symptoms before noted were increased. There was great uncertainty of movement, and examination of the fundi showed a very slight degree of secondary atrophy. The spinal fluid was under marked pressure, gave a reaction for globulin, and contained an increased number of cells, mostly mononuclears. The x-ray examination of the head showed a moderate hydrocephalus and a probable tumor above the sella turcica. About 10 days after his admission, a slight rigidity of the neck was noted and from that time on the child grew constantly weaker, there were slight daily fluctuations of temperature of about $2\frac{1}{2}$ degrees. He died after being under observation for 42 days. The acquired ptosis and the curious tremor of long standing noted in the extremities and the gradually de-

veloping paralysis of the movements of the eyeballs excepting those produced by the external recti with resulting external strabismus in a child previously well, led one to venture the diagnosis of a tumor of the mid-brain, interfering with the nuclei of the third and fourth cranial nerves. The ataxia might also be accounted for by lesions in this region, involving the red nucleus or cerebellar tracts. Towards the end there was certainly meningitis, probably of tuberculous origin, associated with hydrocephalus, although the tubercle bacillus was not demonstrated. The positive von Pirquet reaction and the subsequent development of meningitis suggested that the tumor was probably tuberculous in origin.

The post mortem findings were given, leading to the anatomical diagnosis of solitary tubercle of the mid-brain and right parietal lobe together with tuberculous meningitis. The anatomical findings confirmed in the main the clinical symptoms described. The writer further discussed the affections produced by mid-brain injury and also the symptomatology of pineal tumor, which was identical with that of primary lesions of the mid-brain.

The order in which the symptoms developed was of the utmost importance in reaching an accurate diagnosis. When the early symptoms were general and attributable to increased cerebral pressure, such as headache, vomiting, optic atrophy, hydrocephalus, etc., followed, it might be, with ptosis and oculo-motor palsies, one would be inclined to place the initial lesion outside of the mid-brain—such symptoms might result from meningitis or tumor elsewhere, possibly originating in the pineal gland whereas, as in the boy here reported, the limitation of the symptoms for months to ptosis and paralysis of the oculo-motor nerves and tremor without evidence of intracranial pressure supported the diagnosis of an injury beginning in the mid-brain and, as far as it went, the absence in his case of an increase of growth or of sexual development suggested that neither the pineal nor pituitary glands were involved.

THE ULCERATED MEATUS IN THE CIRCUMCISED CHILD.

DR. JOSEPH BRENNEMANN, of Chicago, stated that ulceration of the meatus was very common in circumcised children.

There was usually ulceration, scab formation, narrowing of the meatus, painful urination, often partial obstruction, and occasionally hemorrhage at the end of urination. The condition seemed always associated with what was known as the "ammoniacal diaper," and apparently resulted from direct contact of the meatus with the wet diaper. The treatment consisted in applying vaseline or wet boric acid dressings to the meatus, if inflamed, and in the prophylaxis of the ammoniacal diaper. The latter was probably due to a metabolic disturbance that was not yet fully understood but probably commonly due to overfeeding with cow's milk fat as a result of which there was an excessive excretion of ammonium salts in the urine. Inasmuch as the ammonium salts must be broken down to liberate ammonia and this was commonly effected by an alkali, it was well in addition, to reducing the ammonium content of the urine to rinse the diapers to remove all excess of soap and also to boil them for a long time to eliminate the possible influence of bacterial action.

Discussion.—DR. W. MCKIM MARRIOTT, of St. Louis, thought the ammonia which was present did not occur in the urine, when passed, as the kidney did not secrete a urine containing any appreciable amount of free ammonia. The ammonia was produced after the passage of the urine and must be the result of the breaking down of either ammonium salts or urea. Ammonium salts were increased in certain types of feeding and these salts might be broken up by the action of alkali, either of soap left in the diaper or as the result of standing with alkaline soap stools. A more important factor in the production of ammonia in the diaper was bacterial decomposition of the urine either of the urea or of the ammonium salts. Quite a number of bacteria were capable of doing this. It could be prevented if the diapers were thoroughly boiled and the child's buttocks and perineal region kept thoroughly clean.

DYSPITUITARISM SO-CALLED: ABSORPTION OF MEMBRANOUS BONES, EXOPHTHALMOS AND POLYURIA.

DR. ALFRED HAND, JR., of Philadelphia, recalled a case which he had reported in the Transactions of the Pathological Society of Philadelphia, Vol. XVI, 1891-1893, under the heading "General

Tuberculosis" and also in the ARCHIVES OF PEDIATRICS, Vol. X, 1893, under the title of "Polyuria and Tuberculosis." The patient was a boy 3 years old, seen December 1, 1892, with a history of great thirst and polyuria of sudden onset 8 weeks earlier. He had had enterocolitis at the age of 8 months and croup and measles at the age of 2 years. The family history was negative. The boy was undersized, with a dry bronzed skin, exophthalmos, corneal opacities in each eye and anterior synechiae in the right. The thyroid was not enlarged. There had been rachitis. The urine had a specific gravity of 1,000 and the maximum quantity in 24 hours was 150 ounces, containing neither sugar nor albumin. After 2 months, the boy died of bronchopneumonia, the main feature of the autopsy being a yellow area of softening in the right parietal bone involving both tables of the skull, with other areas affecting only the outer table. The kidneys were enlarged and the left had 3 small cysts, and in the pelvis of each was a hard, tuberculous mass; the lungs showed bronchopneumonia and there was small round-celled infiltration of the liver, spleen and kidneys with degeneration of the epithelium of the uriniferous tubules.

Dr. Hand quoted the notes of a case shown before the Medical Society of the State of Pennsylvania, 1906, by Dr. T. W. Kay and reported by him as a case of acquired hydrocephalus, with atrophic bone changes, exophthalmos and polyuria. In the Osler Memorial Volume, there was an article "Defects of Membranous Bones, Exophthalmos and Polyuria, an Unusual Syndrome of Dyspituitarism" by Dr. Henry A. Christian, who reported such a case and had found 2 similar ones described by a German writer, Schueller. The latter said "We can therefore make a presumptive diagnosis of anomaly of the skeleton as a result of disease of the hypophysis." Dr. Christian treated his case with pituitrin which, when given under the skin and into a vein, caused great diminution in the amount of fluid ingested and excreted, but, given by mouth or rectum, had no effect. Dr. Christian also concluded that the condition was due to disturbed pituitary function.

To the above group Dr. Hand added a sixth case seen recently. This patient was a boy 4 years of age, from whom there was removed at the age of 2 years a tumor-like swelling from the left parietal region; there was absence of bone underneath the tumor down to the dura. Section showed a slight degree of in-

inflammation, but mainly a myxomatous change. Since then other swellings had appeared, and exophthalmos which was greater on the right, but as yet there had been no polyuria.

Analysis of these 6 cases seemed to render the theory of dyspituitarism insufficient to explain the syndrome, although the polyuria undoubtedly depended on a disturbance of the hypophysis; the bone changes seemed to be the primary condition, causing the exophthalmos mechanically by changes in the orbital plates, and the polyuria by changes in the sella turcica. The cause of the bone changes was not clear and further observations were needed before this interesting and curious group of symptoms could be satisfactorily explained.

USE OF FRESH VACCINES IN WHOOPING-COUGH.

DR. ROWLAND G. FREEMAN, of New York, stated that the vaccines for the prevention or cure of whooping-cough had been used for the past 8 years, and while some enthusiasm had been shown by certain writers, the general opinion had been that they were of but little service in the treatment of whooping-cough, although possibly of some value in its prevention. His own attitude was that they did not modify the course of whooping-cough, and he had never seen a case of whooping-cough apparently prevented by their use.

Two years ago he saw Dr. Huenekens' paper on the application of the complement fixation test for the detection of antibodies after the injection of whooping-cough vaccines, in which he showed that the antibodies were not present unless the vaccines were freshly prepared and that after a week of storage but little antibody production resulted from their injection even in large doses. It seemed to him that this fact might explain the contradictory reports from the use of whooping-cough vaccines in the course of their work. He felt that it should be tried out. He was, however, unable to report any institution work but had brought together all the cases in which he had used it in private practice, hoping to stimulate interest in these fresh vaccines and thus render it easier to obtain them. If we were to have the opportunity to give the vaccines a fair trial, we must have some laboratory producing fresh vaccines every week.

The present series of cases which Dr. Freeman reported included 16 children with whooping-cough in which the vaccines

were used at various periods of the disease. In 5, no results were obtained. Of these 5 children, 3 were early in the disease and the other 2 very late. Of the 11 remaining cases, in 9 a very material improvement took place and in 4 of these a practical cure was obtained. His confidence in the vaccines had been somewhat shaken by the results in one family of 6 children, reported in the paper, who failed to react, but the good results obtained in other cases and the quite remarkable results obtained in certain beginning cases convinced him that these vaccines should have an extended use, particularly in institutions, where controls might be used to demonstrate whether we might not have in these vaccines a valuable method of reducing the large mortality from whooping-cough.

SOME OBSERVATIONS ON RICKETS.

DR. JOHN HOWLAND and DR. EDWARDS A. PARK, of Baltimore, made this contribution which consisted in a lantern slide demonstration showing the alterations at the junction of the shaft and cartilage in rickets as determined by the x-ray. A definite correlation was shown between the x-ray signs and the actual pathological conditions. Proof was adduced that the calcium deposits in the cartilage cast well-defined shadows. The effectiveness of cod liver oil as a therapeutic agent in rickets was demonstrated by serial x-ray pictures. In animal experiments, a beginning calcium deposit was demonstrated 2 days after beginning the administration of cod liver oil. In human beings, the calcium deposit in the cartilage was definitely demonstrable at the end of 3 weeks after beginning the administration of cod liver oil. The probable relation of cod liver oil to the process of repair was discussed.

Discussion.—DR. W. McKIM MARRIOTT, of St. Louis, said that we do not yet know all the factors which cause a deposition of lime salts to form bone. In order to gain some information regarding the nature of the process, we prepared an "artificial blood," that is to say, a solution containing all the inorganic constituents of blood plasma. It contained phosphates, lime, magnesium salts, sodium bicarbonate and carbon dioxide, the latter being at a tension of 40 mm.. Such a solution was perfectly clear but a precipitate occurred if a portion of the carbon dioxide was

removed, or if more bicarbonate, calcium salts, or inorganic phosphate were added. The precipitates obtained in these various ways each had different compositions. The only precipitate which had a composition the same as that of bone was obtained by increasing the amount of phosphate in solution. A very small increase in the amount of phosphate in solution caused a very considerable precipitation of a substance having the approximate composition of bone. It would, therefore, seem likely that the method by which bone is laid down in the body is by an increase in the amount of phosphate present at some point and that a mere increase in alkalinity is insufficient. Such being the case, it would be interesting to know whether or not the phosphate content of the blood is increased following the administration of cod liver oil.

DR. HENRY J. GERSTENBERGER, of Cleveland, said Dr. Howland made the eradication of rickets seem possible. They had fed 1,200 babies or more on a synthetic milk, containing 10 per cent. fat in the form of cod liver oil, and they had yet to see the first case of spasmophilia or rickets among the children so fed. Their idea had been to incorporate the cod liver oil in the food and thus prevent rickets.

DR. CLIFFORD C. GRULEE, of Chicago, said that Dr. Femster had been making observations on normal children, feeding phosphorus, and by this means he had been able to produce a thickening of the ends of the bones very much the same as that produced by the cod liver oil. They had noted that with a longer feeding of phosphorus there was a greater thickening at the epiphyseal line. In these children the phosphorus was used alone and not in combination with cod liver oil.

DR. HOWLAND said that he and Dr. Kramer had done work in which they had studied the phosphate content of blood after feeding cod liver oil and had found it greatly increased. What brought that about he could not say. In one case in which they had found $1\frac{1}{2}$ mgs. inorganic phosphorus per 100 c.c. of blood, after feeding cod liver oil they had found 16 mgs. of inorganic phosphorus. That result had been duplicated in other instances. This was a subject that needed further investigation. It seemed that cod liver oil had something to do with the utilization of phosphorus.

THE ARGONNE ASSOCIATION.

DR. ROYAL STORRS HAYNES, of New York, presented a lantern slide demonstration of the work being done by the Argonne Association in caring for dependent children in France and explained the aims of this organization. The work had been begun under the Red Cross, but, as it would require a period of years to complete the demonstration, it was thought best to have a separate organization. The work was divided into 3 sections, the first being devoted to the care of children under 4 years of age, the second to the care of those from 4 to 14 years, and the third to the vocational training of older children. They believed that the proper care of the dependent child should carry the child under one control until he was able to emerge a self sufficient citizen. In the first section, the children were placed in foster homes under the supervision of a visiting nurse and a medical director. The visitor became an older sister to the children and looked after them not only in respect to their physical welfare but also from the standpoint of moral discipline. Provision was made for education in the second section and also for supervised play. In the third section, special attention was paid to vocational training for both boys and girls. Inasmuch as France was greatly in need of agricultural workers special attention was being paid to training the boys for this work, but the special aptitudes of the children were studied and the occupation chosen in which they would be happiest and most useful.

SARCOMA OF THE KIDNEY.

DR. ROWLAND G. FREEMAN, of New York, stated that this case was of interest because of the rapid production of metastases, after operation and also because of the type of tumor. The child was $2\frac{1}{2}$ years of age and weighed $26\frac{1}{2}$ pounds. When she came under observation, she had been failing in health for 2 months. X-ray examination confirmed the diagnosis of tumor of the kidney on the left side. Six weeks after operation, she was brought back to the hospital in a desperate condition, with a temperature of 102° . F., dyspnea, and râles over the entire chest. The x-ray showed numerous metastases in the lungs.

FOCAL INFECTIONS IN CHILDREN.

DR. OSCAR M. SCHLOSS, of New York, presented a report concerning focal infections of the tonsils which were responsible for 2 types of disturbances. In one group of cases, the disturbances were cyclic in character, were accompanied by fever and persistent vomiting with a large elimination of acetone bodies in the urine and an accumulation of acetone bodies in the blood. There were 8 cases in this group.

The other types of disturbances was evinced by mild nephritis. The urine contained albumin in moderate amounts, red blood cells, hyaline and granular casts and some leucocytes. These children were not especially ill. The symptoms were traced to a tonsillar infection and subsided promptly when the infected tonsils were removed. Two such cases were observed.

In most of the cases in both groups, the tonsils were not large. In several instances the tonsils had been previously removed and there remained only a small amount of tonsillar tissue between the faucial pillars.

HYPERTROPHIC STENOSIS: FAILURE OF GRUEL
FEEDING: OPERATION: SLIGHT IMPROVE-
MENT: THREE CASES DOING NICELY
ON GRUEL FEEDING.

DR. H. M. McCLANAHAN, of Omaha, stated that since June 1919 he had had under his care 6 cases of congenital hypertrophic stenosis complying with the following syndrome: loss of weight, vomiting several times a day, frequently expulsive in character, stools, small, dark and without any evidence of milk digestion, visible peristalsic wave, and scanty urine. In 3 or 4 cases recovering without operation a movable tumor could be palpated. In 1 of the cases not operated on, the diagnosis was further confirmed by a roentgen plate. Four of the 6 cases recovered under gruel feeding, their ages being 5, 5, 7, and 11 weeks. These cases were placed on thick gruel in the manner described by Dr. L. W. Sauer and later by Dr. Langley Porter in the ARCHIVES OF PEDIATRICS, July, 1919. The rate of gain varied but all made slow but steady improvement. The fifth baby made fair progress for 2 weeks, but the parents, seeing the results on the next case reported, demanded operation. This baby was

operated on and made a good recovery, but it was the writer's belief that this baby would have recovered without operation. The sixth patient was in desperate condition at the time of operation, the walls of the stomach being dark in color, in striking contrast to that of the intestines. This infant had congenital hypertrophic stenosis, a general staphylococcus infection and undoubtedly an acute gastritis. The case would undoubtedly have terminated fatally without operation.

A CASE OF PORTAL THROMBOSIS.

DR. RICHARD M. SMITH, of Boston, stated that portal thrombosis was a rare condition in children. This patient, a child 3 years old, was admitted to the Massachusetts General Hospital, December 22, 1919, giving a history of acute rise in temperature with cough 7 days before. On the morning of admission, a small ecchymotic spot was noticed on the forehead and another on the sacrum. Physical examination showed an enlarged heart, with a systolic murmur heard all over the precordia. The first sound at the apex was loud. The spleen was palpable below the costal margin. The blood count showed hemoglobin, 40 per cent.; red blood corpuscles, 1,960,000; white cells, 18,000; differential polymorphonuclears, 60 per cent.; small mononuclears, 24 per cent.; large mononuclears, 10 per cent.; transitionals, 3 per cent., and neutrophile myelocytes, 3 per cent. The blood platelets were normal. The blood pressure was 90 systolic, and 70 diastolic. The roentgenogram showed the heart to be enlarged. The electrocardiogram showed a sino-auricular tachycardia (rate 160), but no auricular hypertrophy or ventricular preponderance. The temperature on admission was 102.8° F., pulse 160, respiration 25. The child was transfused with only temporary benefit. The abdomen gradually distended with fluid, the superficial veins in the upper portion became enlarged, the spleen increased greatly, finally reaching nearly to the umbilicus, and assuming a transverse position in the abdomen. The pulse remained rapid, and respiration was 30 to 35 until just before death, when it rose to 45 to 50. Six weeks after admission, the child vomited a large amount of bright red blood. Transfusion was repeated but the child died February 12, practically 2 months from the onset of the infection.

The striking points in this case were the persistent fever, the

enlarged liver and spleen, engorgement of the superficial abdominal veins, severe anemia and intestinal hemorrhage. No diagnosis was reached during life. At autopsy thrombosis of the portal vein and its great radicles was found, with passive congestion of the spleen, ascites, hypertrophy and dilatation of the heart, edema of the lungs and anemia. Undoubtedly the thrombosis was of infectious origin arising in connection with the initial infection of the respiratory tract.

A CASE OF PARALYSIS OF THE RESPIRATORY MUSCLES.

DR. W. MCKIM MARRIOTT, of St. Louis, said the chief interest in this case was in the treatment applied. The patient was a girl, 10 years of age, who had suffered from a severe attack of diphtheria 6 weeks previously. She developed paralysis of the palate, ocular muscles, legs, back and neck muscles, and partial paralysis of the arms. Ultimately the diaphragm became involved, so that it failed to move at all during inspiration. The thoracic respirations were at first very active, later the intercostal muscles began to lose and the child became cyanotic and semi-comatose. The child was obviously dying from suffocation, and it was thought that if the respirations could be maintained for a sufficient period of time to allow for restoration of function of the respiratory muscles that recovery would be possible. Artificial respiration was given by means of the Erlanger-Gessel air current interrupter connected with a nitrous oxide mask. The child failed to coöperate at first, but later it was possible to get her to open the glottis at the right time so that air could be forced into the lungs at the regular rate. The effect was immediate. The cyanosis was relieved and after a period of about 10 minutes of artificial respiration the child fell asleep and the mask was removed. Cyanosis slowly developed and was again relieved by a period of artificial respiration. This was kept up more or less continuously for 5 days, at the end of which time, the function of the respiratory muscles began to return and the child was able to breathe without the aid of the apparatus. She made a complete recovery and is now in perfectly good health.

CONGENITAL ATRESIA OF THE ESOPHAGUS.

DR. HENRY L. K. SHAW, of Albany, said he reported this

case for the purpose of emphasizing the historical side more than the clinical. This child gave a history of food coming out of its nose, and on attempting to pass the stomach tube it only went down a short distance. After giving barium, the x-ray showed the esophagus filling but the barium did not pass through to the stomach. Examination of the lungs showed them filled with fine râles. The child died and at autopsy it was found that the upper one-third of the esophagus ended in a cul-de-sac and had no relation to the lower part which opened into the trachea.

A similar case was reported in 1682 and another in 1703 by a Dr. Gibson, Physician General to the British Army, and a grandson of Oliver Cromwell. Dr. Shaw read this description which was so accurate that it would be difficult to improve upon it today.

PRIMARY SARCOMA OF THE THYMUS.

DR. L. EMMETT HOLT, of New York, said this patient was a child, 6 months old, with symptoms dating back only 4 weeks. The parents were healthy as were 2 other children. This child was small, and gained in weight slowly, weighing 9½ pounds at the age of 6 months. The symptoms were merely an increasing pallor and slight fever. There were minute hemorrhages over the neck and extremities. The case was looked upon as one of severe secondary anemia of unknown origin. The temperature ranged between normal and 103° F. As the hemorrhages continued to appear, a transfusion of blood was given which was of no permanent value. The child failed rapidly and died. At autopsy, a thymus weighing 36 grams was found, which was very large, the upper limit of the normal being 10 grams. Besides the sarcomatous condition of the thymus, similar changes were found in one of the lymph nodes, in the spleen and in the lungs. The case was interesting because the child presented none of the symptoms usually associated with enlarged thymus, and because of the rarity of sarcoma of the thymus in infants and young children, this case being perhaps unique.

A CASE OF CARDIOSPASM.

DR. GODFREY R. PISEK, of New York, said that the occurrence of cardiospasm in early life was still so rare as to make it

justifiable to report this case. Since adult cases might trace their inception to early life or to congenital defects, the pediatrician might well consider these cases worthy of study. Neurotic or primary cardiospasm was attributed by some authorities to a contraction of the left crura of the diaphragm, by others to defective innervation, or to localized atony of the esophagus.

The case reported was that of a girl, 12 years of age, who first came under observation in September, 1919. The family and past history were negative. When 3 or 4 years old, the child developed a strong will and was said to be "temperamental". This trait grew stronger as she grew older. Otherwise she was an outdoor athletic child. She had a peculiar appetite, disliking vegetables, eggs and sweets. About a month before coming under observation, she complained that food choked her and at night she had a similar difficulty, complaining of a strangling sensation. A cough developed in connection with the night spasms, unconscious as far as the patient was concerned, and upon which codeine had no effect. Physical examination revealed nothing abnormal except some retraction of the supra- and infra-clavicular spaces, a slight tremor of the upper eyelids, a tendency to relaxation of the spine and bowing of the shoulders and evidence of orthostatic albuminuria. Radiographic and fluoroscopic examination confirmed the diagnosis of cardiospasm. After an esophagoscopy under general anesthesia, a moderate dilatation was done but no anatomical basis was demonstrable. Bougies were passed at about fortnightly intervals until her departure for Florida in March of this year. In the South she did well at first, but she then contracted "malaria", lost weight, going down rapidly to 80 pounds—20 pounds below normal—and the original symptoms of her cardiospasm returned. She was brought North and carefully examined again. The gastric contents showed retention, and the fluoroscopic examination a considerable dilatation of the esophagus with a smooth fusiform constriction at the cardiac end. Bougies were passed every fourth day. She was given atropin and a measured diet of 3,000 to 3,500 calories per day. She had gained 15 pounds in the last 29 days. Whether it would be necessary to pass a duodenal tube and give the stomach a complete rest for a time was still a question. This case showed that it was not so easy to treat this condition as one was led to suppose by the literature.

A CASE OF LYMPHOSARCOMA.

DR. CHARLES A. FIFE, of Philadelphia, said the unusual features which prompted him to report this case of lymphosarcoma were: 1. The treatment by x-ray of an enlarged cervical lymph node, the probable primary lesion, on the supposition that it was tuberculous. The node had not been excised. There was no other evidence of tuberculosis. 2. Wide metastases, within 5 months of the cessation of roentgenism. 3. The extensive involvement of the tracheobronchial lymph nodes producing massive exudation into the left pleura, but causing no other signs of mediastinal compression. 4. The high, irregular temperature, extending over a period of 1 year. 5. The polynuclear leucocytosis in blood and lymphocytosis in pleural exudates. 6. The tremendous enlargement of the spleen and of the liver. 7. The varieties of previous diagnoses, including influenza, endocarditis, secondary anemia, tuberculosis, adenitis, leukemia, Hodgkins' disease and substernal empyema. 8. The rapid reduction in size of the bronchotracheal lymph nodes, and the improvement in the condition of the patient after x-ray treatment to the mediastinal region. 9. The marked effect of x-ray and radium on the lymphosarcomatous tissue as shown in the athologic specimens.

The patient was a boy of 9 years giving a negative medical history until his seventh year when a slowly enlarging right cervical lymph node was detected. Notwithstanding the removal of tonsils and adenoids, the gland attained, in 10 months, the size of a large egg. After 3 roentgen treatments given in the course of a month, the mass became the size of a hickory nut, and after 20 treatments in 15 months, the disease was thought eradicated. The boy was apparently in perfect health for a third of a year and then during the next 5 months, before coming under observation, had attacks of fever with remission. There was progressive anemia, slight leucocytosis, but the red blood cells did not show irregularity in shape until about 4 months after the onset of the fever. When he came under observation, he had an irregular temperature, ranging from normal to 103° F; pulse 130, respiration 36. He was weak, mildly dyspneic, had a slight non-productive hacking cough on change of position, and no other symptoms. He had a few palpable cervical and inguinal lymph nodes, buck-shot size, no skin tumors, no cutaneous or mucous membrane

hemorrhages, except in the left pleura which was entirely filled with fluid. The heart was completely displaced, the right border being in the right nipple line. There was also a mediastinal mass displaced to the right. The liver was slightly enlarged; the spleen much enlarged. There was no demonstrable ascites. A quart of dark amber fluid was removed from the left pleura after which the heart returned to normal, the area of dullness corresponding to the mass in the mediastinum receded and the heart assumed its normal position. Within 48 hours the chest refilled. The fluid contained about 3000 cells per c.c., but subsequent specimens were highly leucocytic. No tubercle bacilli were found, guinea pig inoculation was negative and the Wassermann was negative. There was at first slight general improvement following the x-ray treatment, but this improvement was only temporary. The x-ray treatment, radium and 3 blood transfusions failed to stop the progress of the disease. The child died about 6 months after coming under observation. The hemoglobin had fallen to 13 per cent., the red cells to 500,000, and the whites to 2000, 80 per cent. being lymphocytes. The post mortem diagnosis was small and large-celled lymphosarcoma. The structures involved were the cervical, tracheobronchial and retroperitoneal lymph nodes, the spleen and the liver. The chief histological interest lay in the fact that the nodes, low down in the abdomen where they were unaffected by radiation, were full of typical, active tumor cells, while the lymph nodes in regions treated by x-ray or radium showed retrograde changes in the tumor cells and thus many tumor cells were replaced by dense connective tissue.

HEART DISPLACEMENT APPARENTLY DUE TO MEDIASTINAL EMPHYSEMA FOLLOWING ASPIRATION PNEUMONIA.

DR. E. C. FLEISCHNER, of San Francisco, stated that this boy, 3½ years of age, following a fall into a sandpile, became wheezy. Four hours later he was brought to the hospital with sibilant râles over the lungs, both anteriorly and posteriorly. The x-ray showed no foreign body and no condition calling for surgical interference. The heart was displaced slightly to the right. The boy developed

a definite pneumonia on the left side involving the middle lobe. The displacement of the heart did not seem to be due to fluid. At the end of 48 hours, a subcutaneous emphysema appeared above the clavicle and extended down to the pelvic bone. The pneumonia subsided to be followed by a bronchiectasis in the left lung. He had a prolonged illness, but the x-ray, taken 5 months after the accident, was to all intents and purposes normal. In this case the heart had gone rapidly and completely to the right. It seemed reasonable to believe that injury during the accident had caused air to push through the lung and force the heart to the right, and then work its way out into the subcutaneous tissues.

THE DUCT SIGN IN MUMPS.

DR. DAVID MURRAY COWIE, of Ann Arbor, reported that in 97 per cent. of 57 cases of parotid mumps a red spot was observed at the orifice of the Steno's duct which developed and disappeared under the influence of the disease. The duct itself became teatulated. The detailed description of the color change and the duct involvement was given, and illustrative cases cited. The sign developed early in the disease, sometimes ahead of the swelling of the parotid and disappeared when the duct returned to normal. The sign was uninfluenced by the degree of fever. Submaxillary ducts showed no redness when the submaxillary glands were involved.

Whether the duct sign was pathognomonic of specific parotitis or was present in other acute inflammatory conditions had not been determined. Because of the occasional occurrence of teatulation of Steno's duct in a certain percentage of apparently normal persons and the occasional finding of redness of its orifice, careful differentiation should be made. The duct sign should be regarded simply as corroborative evidence of parotid gland involvement.

Discussion—DR. FREDERIC W. SCHLUTZ, of Minneapolis, recalled having observed this sign among negro troops in about 50 per cent. of the cases. He stated that he believed the contagious period of mumps was longer than that given in the text books. It was fully 21 days, though as a rule it was stated as shorter than this.

A CASE OF PRIAPISM RESULTING FROM RAPIDLY
SPREADING MALIGNANT MYXOSARCOMA
WITH GENERALIZED METASTASIS.

DR. DAVID MURRAY COWIE, of Ann Arbor, reported this case, the unusual feature of the case being the early age of the boy, 9 years.

STREPTOCOCCIC ANGINA WITH PURPURA HEMOR-
RHAGICA AND MULTIPLE INFARCTS OF THE
SKIN AND SUBCUTANEOUS TISSUE IN A
CHILD TWO YEARS OLD, HEALING
UNDER DAKIN'S SOLUTION.

DR. WALTER R. RAMSEY, of St. Paul, stated that this patient, 2½ years old, was brought to the city from a distance of 200 miles. His family and past history were negative. His present illness began with a sore throat, 2 weeks before. After a few days there was swelling of both legs and an offensive odor from mouth and nose. Upon arrival at the office the child was moribund. The skin and mucous membranes were extremely pale and there was marked edema about the face, the eyes being swollen shut. The legs and feet were markedly edematous. There were numerous petechial areas scattered over the entire body. The fauces and tonsils were covered with a foul gray membrane, and the entire mucous membranes of the mouth, including those of the lips, were gangrenous. The temperature was 104° F, and the pulse very rapid and weak. The condition was so suspicious of diphtheria that 20,000 units of antitoxin were given immediately. The culture, however, proved negative. The purpura cleared up under this treatment. Deep sloughs developed in a few days on the right wrist, on both ears, both elbows and on the perineum. The palate sloughed off. The middle phalanx of the middle finger on the right hand sloughed out, and later healed perfectly, leaving a finger with 1 phalanx missing. A dark area over the occipital region sloughed out and part of the bone also. All these areas healed under Dakin's solution applied 4 times a day.

REPORT OF A CASE OF ANAPHYLAXIS FOLLOWING
INTRADERMAL PROTEIN SENSITIZATION TESTS.

DR. HENRY J. GERSTENBERGER, and DR. J. H. DAVIS, of Cleveland, were called in July, 1919, in the absence of the family physi-

cian, to see this child, 12 months old, who had a distinct dry eczema of the face, chest and arms, with a decided emphysema accompanied by wheezing and a somewhat labored expiration. Under dietetic treatment and atropin the child improved. The mother and nurse felt that when the atropin was reduced or stopped the symptoms returned.

When the family physician returned in August, he found an increased thymic dullness and requested an x-ray of the chest. A wide shadow was found in the thymic area, which according to the roentgenologist was due to an enlarged thymus. Consequently the family physician stopped the atropin, and had the thymus exposed every 3 or 4 weeks for a total of 5 exposures. The condition of the child grew worse instead of better and the thymic shadow remained the same. The family physician then reordered the atropin and the child again improved. During the early days of December, the child developed a severe cold and as a result had a severe asthmatic attack. He was then seen by Dr. Gerstenberger together with the family physician, and admitted to the pediatric service of the Lakeside Hospital. His condition seemed worse than at any previous time. A diet was again built around skimmed milk, the atropin was reordered in large doses, and cod liver oil, which was being given, continued. Within 48 hours there was a distinct improvement.

The child was given the tuberculin test which showed a slight swelling uncharacteristic of the regular positive tuberculin test, and this was considered to be due to trauma. As his brother had been exposed to whooping-cough, he received 2 injections of pertussis vaccine.

On December 5, the x-ray picture showed a decidedly smaller shadow than the last plate taken during October; in fact, it was quite like that of a normal child. The family physician attributed the child's improvement to this and not to the influence of the atropin. He was especially convinced of this in view of the fact that on November 10 he had performed cutaneous scratch tests with different proteins in simple saline solution all of which proved negative. It was decided to try the intracutaneous method before deciding that the entire clinical picture was due to enlarged thymus. As these injections were given, it was noticed that the child became mildly cyanosed, but no alarm was felt as it was customary for him to show this symptom on slight exertion. After

several proteins had been injected, egg albumin was administered. During the injection the cyanosis suddenly became extreme and severe. Adrenalin was immediately administered subcutaneously in repeated doses, totaling about 1 c.c. While the respiratory difficulty was at its worst, a pale swelling about the size of a quarter of a dollar was seen at the seat of the egg yolk allergen and egg albumin injections. The other areas of administration were negative. It was decided after a few days rest to repeat the test. Tests were carried out for several days with other proteins (cow's milk and casein and albumin and vegetable proteins) as a result of which it seemed as though after all the mechanical factor of an acute emphysema produced as the result of prolonged exertion might have been mainly responsible for the extreme condition of the first day. Egg yolk allergen was then tried and was followed by an extreme state of apnea and cyanosis. By means of subcutaneous injections of adrenalin and the use of artificial respiration, the child was revived. A large urticarial wheal was seen at the site of the injection. The child had never received egg in any form so they felt justified in assuming that the hypersensitiveness was congenital. Had adrenalin not been at hand at the time of this test, a fatality and not a recovery would have been reported.

On December 16, an x-ray photograph of the thymic region again showed an abnormally wide shadow. The fluoroscopic examination demonstrated that this seeming contradiction in the x-ray plate depended upon the phase of respiration when the x-ray picture was taken. A picture made during extreme inspiration gave a practically normal shadow, and one taken at extreme expiration a markedly abnormal one.

The following points in this case were of interest: 1. A boy 17 months old who had never received egg in any form developed an extreme anaphylactic shock after an intracutaneous administration of egg yolk allergen and egg albumin in doses of 1 and 2 mg. 2. This child, who had received cow's milk from his third week of life and who had suffered from eczema and asthma showed a negative intracutaneous test to cows' milk casein and cows' milk albumin. The intracutaneous injection of cow's milk allergen responded within 24 hours with an indurated and red area of infiltration not unlike that of an ordinary positive von Pirquet test, but entirely different from an urticarial wheal. 3. This same boy

was not sensitive to other proteins. 4. The first severe anaphylactic shock (Dec. 8) did not prevent the development (Dec. 13) of a second following the administration of egg yolk allergen 5 days later. 5. The x-ray photographs made at different intervals on the same day showed a definite wide abnormal thymic shadow and again a perfectly normal picture. The former as found by fluoroscopic examination occurred during extreme expiration, the latter during extreme inspiration. 6. The thymus gland, if it really were large in an abnormal sense, did not produce the respiratory difficulty in a mechanical way. 7. This patient might be a case of status lymphaticus and this condition might be responsible in him for his congenital pathological sensitiveness to egg proteins and his anaphylactic reaction. If, however, he should be found not to be sensitive to other proteins, especially horse serum and horse hair protein, the status lymphaticus could hardly be accepted as a causative factor in his condition, for it would be difficult to imagine how a status lymphaticus could make a child sensitive solely to egg protein and not to oats, milk, horse serum or horse hair proteins.

BLOOD FINDINGS IN A CHILD FIVE YEARS AFTER SPLENECTOMY.

DR. HOWARD CHILDS CARPENTER, of Philadelphia, presented in detail the average results of 13 blood examinations in a white boy, 10 years of age, who had had his spleen removed 5 years before for familial hemolytic icterus of the Chauffard-Minowski type. The result of the operation was satisfactory and the case was reported in the literature a few months later. The child's present condition showed him to be an active, intelligent child of nervous temperament, with good muscular development and scant adipose tissue. He was 6 pounds underweight for his height and age, had a faint mitral regurgitate murmur with no demonstrable hypertrophy. The thyroid was not enlarged and there was no jaundice or ascites. The external lymphatic glands were moderately enlarged. The tonsils were enormously hypertrophied. The average of the 13 blood examinations made during the last 6 weeks showed hemoglobin 82 per cent.; red cells 4,288,000, and white cells 15,000. No Howell-Jolly bodies were found. Prior to operation the hemoglobin was as low as 23 per

cent., and the red cells were down to 2,020,000. There was still present evidence of bone marrow regeneration as shown by the high color index, the continued leucocytosis, moderate chromatophilia and poikilocytosis, high transitional and eosinophile counts, and finally reticulation of the erythrocytes. There was an unusually quick coagulation time in spite of a rather low platelet count, indicating in this case either a rapid availability of the platelets for the purposes of coagulation or an increased amount of prothrombin in the platelets, or a large percentage of macroplatelets. The low platelet count was simply the continuation of the condition which undoubtedly existed before the splenectomy, as it was well known that cases of hemolytic icterus showed low normal values, sometimes even less than 200,000. There was also evidence of lymphatic activity shown by absolute lymphocytosis, and by the enlargement of the external lymphatic glands and the very large tonsils.

FURTHER DEVELOPMENT OF INFANTS' HOSPITAL.

DR. HENRY I. BOWDITCH, of Boston, said the present day tendency among hospitals was to develop the scientific side and its laboratories so as to bring them closer to the clinics. This valuable information must be properly weighed to be of true service, for we were dealing with the delicate human body and mind and not with test tubes, and common sense and experience played an important rôle.

This idea was being exemplified in the "On Shore" Department of the Boston Floating Hospital, which was being worked out on the basis of a 10 bed clinic. This new development had been made possible by the generosity of a few friends, which had permitted the purchase of 3 small adjoining apartment houses which he had had remodelled. The building and equipment had cost \$45,000. Ten patients they felt was the best number, as they could be more readily followed clinically, scientifically and socially. This clinic was held in 2 wards, and the necessary isolation room, under the expert care of 3 nurses. The wards were so divided that there was less noise and the children were able to have perfect naps morning and afternoon; symptoms dependent upon restlessness, vomiting, etc., were markedly de-

creased thereby. The clinic was so manipulated as to give 5 new patients monthly. The scientific laboratories, chemical and bacteriological, were brought into close proximity, making consultation easy, but carefully separated so that noises, natural odors, etc., did not penetrate.

On Tuesday afternoon of each week a health clinic was held composed of 150 families, held under the guidance of an assistant visiting physician. On Wednesday the return "family control" clinic was held, in charge of a visiting physician. Two clinics were held for weighing the children, getting clinical histories and giving treatment.

Since opening on December 15, 1919, 30 patients had been received, 23 of which were diagnosed as regulation of feeding and malnutrition in different degrees. It was the plan to admit only nutritional cases, infection being carefully guarded against. The study so far had been to organize methods of attacking the question of the different food elements in growth and lack of growth. Each case was to be completely examined, clinically, chemically and bacteriologically. The plan was to have patients return at definite periods for chemical and bacteriological tests, physical and mental examination, for 10 years. In this way they followed the development of body and mind. A weekly clinic to meet the parents had proved satisfactory, allowing personal touch to impress the parents with the importance of physical care, proper dietetics and discipline. In time groups of parents, developing along natural lines, would be formed. In this way they hoped to understand the mental capacity of the parental group and adapt their ideas to their particular peculiarities; thus comprehending the good points of diet, life, etc., of the different races, and thus they hoped to lead them to a better understanding of child life. It was hoped that this beginning might lead others to establish similar "small enough" institutions for the same study and for the protection of their medical work.

THE EFFORT SYNDROME IN CHILDREN AND YOUNG ADULTS.

DR. CHARLES GILMORE KERLEY, of New York, stated that during the late international war English army surgeons learned that when certain recruits were put to prolonged hard work at

drills, hikes, and other hard exertion, they failed to measure up to the endurance standard required of the soldier in the field. To this condition, Dr. Thomas Lewis applied the term "effort syndrome". The condition was described by Friedlander and Freyhof as "constitutional neuro-circulatory asthenia." The boy or girl who might qualify for the "effort syndrome class" came to the physician with the typical story, which condensed meant that there was an absence of capacity for sustained effort, both mental and physical. Wherever endurance was required he failed. In girls these constitutional peculiarities might attract less attention and be more readily excused when present. Among animals those of defective capacity for economic reasons usually had a short career. The defective functioning human, however, if well born, was urged and forced and stimulated to accomplish what was not in him. Millions of dollars were wasted on youths who were physically and mentally unable to meet the standard set up by ambitious parents and friends in an effort toward their so-called higher education. The highly trained teaching talent of our preparatory schools and universities was wasted in part on poor student material, 25 to 50 per cent. of which should be scrapped and put to productive occupation. Before a boy was permitted to avail himself of unusual educational advantages it should be determined that he was worth it. The high school should serve as a clearing house. In addition to mental attainments required for college entrance it should be required that a candidate submit testimonials as to physical fitness and mental capabilities from the head-master or high school principal. What was needed was expert occupational diagnosticians who would aid in placing the boys at work for which they were fitted. The boy who belonged to the class under discussion should leave school at the age of 15 or 16 years and take up business. In order to make a reasonable success the occupation should be one which was not strenuous.

It was unusual to find persons of this type the offspring of strong, vigorous young persons. In the majority of instances they were the offspring of the weakly woman of little resistance and of lessened endurance capacity. A strong, vigorous mother would do much to offset the influence on progeny of a weakly male. The progeny of vigorous males was greatly reduced by inferior mothers. Frequent child-bearing had apparently been

a factor in some instances. The necessity for a great deal of attention to the physical development of those who would some day be mothers was a very urgent need.

Discussion.—DR. J. P. CROZER GRIFFITHS, of Philadelphia, said Dr. Kerley had described a class of people for whom there really seemed to be very little future, entirely without any fault of their own. The condition was clearly inherited. There was another and larger class of the unfit in which there was a distinct constitutional tendency to this condition, but in which careful guarding in childhood and adolescence might develop individuals fitted in the future to fill a useful place in society. He referred particularly to that class of over-worked and over-trained school children who found it difficult to keep up with their classmates in school. This applied particularly to those who were not able to send their children to private school, and who must depend entirely upon public school training. Here there were hard and fast rules insisted upon to which these children of inferior constitutional character could not tolerate. Little allowance was made for such children. It did not seem possible for the public schools to have special classes for them, and yet they needed an education and should have it. This was a matter well worthy of consideration by all of us.

THE FOOD REQUIREMENTS OF CHILDREN AFTER THE FIRST YEAR.

DR. L. EMMETT HOLT, of New York, exhibited a number of charts showing the results of an attempt to estimate the total caloric needs of healthy children over 1 year of age. This total was determined by the 4 factors which made it up, namely: (1) basal requirements, (2) needs for growth, (3) for activity (4) loss by excreta. For basal needs, the curve of Benedict and Talbot had been adopted. The per kilo requirement diminished steadily from 1 year to the completion of growth. Growth needs were calculated from the rate of increase in height and weight for the different years; these would naturally be greatest at periods when growth was most rapid. The loss in excreta at all ages was practically 10 per cent. of the calories taken. These 3 factors, though subject to individual variation with different children, were, as averages, uniform and irreducible. The only factor

which differed greatly with different children is the needs for activity. A child with average activity used up nearly one-half his caloric intake in this manner; the very active child much more than this. The total caloric needs for the average child were greatest during the period of most active growth in boys, 15 to 17 years; in girls, 13 to 15 years. At this period their needs exceeded those of adults with moderate activity of both sexes. The adolescent boy required 4000 calories daily. The average per kilo needs for boys was 100 calories at one year; this gradually fell to 80 at 6 years; was then practically constant to 16 years, when it gradually fell to the adult average at 19 years. In general, a little more fat, a little more protein, and a little less carbohydrate was required by the child than by the adult.

THE MISUSE OF MILK IN THE DIETS OF INFANTS AND YOUNG CHILDREN.

DR. B. RAYMOND HOOBLER, of Detroit, stated that the value of milk as a food both for adults and children had been exploited during the past few years to such an extent that its use was being much increased. This had inevitably led to many dietetic errors particularly in the group of children between the ages of 1 and 6 years. These errors might be classified under the headings: 1. Prolonged use of milk as an exclusive article of diet. 2. Increased quantities of milk given along with other foods. Milk might not only be used too long as an exclusive article of diet and in excessive quantities with other foods, but its nutritional value might be injured by boiling. The laity were taught, and rightly so, that milk was an ideal breeding place for germs, and that the growth of these germs might be inhibited by keeping the milk on ice, or the milk might be brought to a boil and then covered. Through this teaching of the printed instructions accompanying certain patent baby foods, he believed, the use of boiled milk was becoming more prevalent and many injuries to nutrition occurred as rickets, scurvy and tetany, together with marked constipation. In certain instances the milk was boiled without realizing it.

Dr. Hoobler exhibited charts showing the diets usually fed between 9 and 12 months, between 1 and 2 years, and between 3 and 5 years, and the relative proportion of the day's calories supplied by milk when 1 quart was fed, viz: 80 per cent. between

9 and 12 months; 58 per cent. between 1 and 2 years; 50 per cent. between 3 and 5 years. The relative proportion of different food elements which was fed when 1 quart of milk was ingested with other foods was also shown, the fat proportion being relatively high and the carbohydrate relatively low. The amount of over-feeding above the basal metabolism which took place when 1 quart of milk was fed was also shown. Often the child would refuse spoon feeding and take only milk, thus making a bad matter worse, since this habit robbed the child of minerals which should come to it in fresh fruits, vegetables and cereals, not to mention the vitamine and antiscorbutic properties which these foods possessed.

A second chart showed the caloric value and proportion of food elements when 1 pint of milk daily was fed in addition to other foods, the amount given being the same as in Chart 1. This chart showed the total calories reduced to within normal requirements and that the proportion of fat and carbohydrate were nearly interchangeable, thus giving the child ample calories to use up its activities. It also showed lowering of the protein down to the maximum for growth, wear and tear. Children fed such a diet were free from vomiting and stupor accompanied by acetonuria so prevalent in children who had been fed a quart of milk daily in addition to a full diet. The propaganda urging the use of a quart of milk daily was fallacious; when followed it led to overfeeding, an unbalanced ration, unhealthy nutrition and frequent attacks of vomiting accompanied by acetonuria.

PRECIPITINS FOR EGG ALBUMIN IN STOOLS.

DR. CLIFFORD G. GRULEE, of Chicago, stated that the preparation of the stools in this series of cases was the same as that reported in a previous article. Egg-white rabbit serum of a titer of 1-40,000 was used. The first series tabulated consisted of 100 stools from 21 cases, with 3 positive reactions; in both instances the children received egg-white in the diet. The second series consisted of 33 cases in which 242 stools gave 5 positives. This series was carried out with an antiserum giving precipitins in a dilution of 1 to 60,000. In this group some of the cases giving positive reactions had had no egg albumin in the diet. It would seem from these results that egg albumin was in nearly every

instance completely broken down by the digestive processes in infants and children. This held good not only for children and older infants but also where egg albumin was used in small quantity for the new born as well. There was only one other possibility and that was that the egg albumin instead of being broken down in the process of digestion was absorbed unchanged. The writers did not feel that the specificity of the precipitin reaction for egg albumin was to any degree disproven by the fact that it was found to be positive in stools where no egg had been present in the diet. They were inclined to attribute such reactions to the complexity of the stool.

SOME OBSERVATIONS ON THE RÔLE OF CERTAIN ANAEROBES IN THE INTESTINAL FLORA OF INFANTS.

DR. LANGLEY PORTER, of San Francisco, said the information they had been able to obtain since their last communication referred entirely to the group of intestinal toxemias in which the abnormal stool bacteria were resistant to dietetic measures usually adequate to produce a change in the flora.

In the course of this study very rarely certain specialized forms of colon bacilli had been encountered. These were highly facultative and extremely acid resistant, and so far no effective method had been devised for overcoming their interference when they were present in the stools. On the other hand, investigation of the evacuations of the majority of patients, whose stools showed a similar resistance to change in the floral balance, revealed the presence of an unusual number of spore-bearing organisms, most often anaerobes, usually *Welchii*, which interfered by virtue of their facultative powers. This facultative function enabled them to utilize any pabulum present. Because of their power in the active stage to utilize carbohydrate, they were especially apt to interfere when any attempt was made to shift a proteolytic flora by feeding the patient a high sugar diet. However, by the method suggested in this communication this interference could be overcome and the disappearance of these spore-bearing organisms from the stools insured. A diet limited in protein and rich in carbohydrate would effect this change.

SOME EXPERIMENTS TO DETERMINE THE PERSISTENCE OF EXTRANEOUS BACTERIA IN THE GASTROINTESTINAL TRACT OF GUINEA-PIGS AS INFLUENCED BY DIET.

DR. A. GRAEME MITCHELL, of Philadelphia, stated that thus far the proof of the implantation of organisms in the intestinal tract rested upon incomplete evidence. Metchnikoff based his claim of the implantation of the Bulgarian bacillus upon experiments carried out by some of his pupils and followers. The work of the latter investigators did not substantiate the theory of implantation.

The present study was concerned only with the attempt at implantation of an extraneous organism, the bacillus pyocyaneus, in the digestive tract of the guinea-pig. The aim had been to study the principles governing the implantation if such could be accomplished. *B. pyocyaneus* had several advantageous characteristics for a study of this kind: It was potentially pathogenic; it produced poisonous substances in culture which in its pathogenic relationship it assumed in various character; it could be fed in large numbers to the guinea-pig without causing ill effects; above all, it was easy of recognition.

With the exception of one experiment in which the guinea-pigs received the organism by stomach-tube, the technic of the experiments was as follows: The guinea-pigs were offered various diets, were fed the *B. pyocyaneus* for 3 days. At variable lengths of time after this the pigs were killed and culture made from the heart blood, the stomach, the duodenum, the ileum, the cecum, and the colon.

The conclusions deduced from these experiments were that when guinea-pigs were fed on a diet of oats, hay, bread and green-stuff *B. pyocyaneus* when fed disappeared from the gastrointestinal tract within 3 days. When oatmeal was given as a sole article of diet the *B. pyocyaneus* had been found at 7 and 9 days after the last administration. The addition of a small amount of green-stuff, or of a certain amount of butter to the oatmeal diet had apparently prolonged the period of persistence of the bacterium. *Pyocyaneus* on these slightly amplified diets had been found to persist about 2 weeks with considerable regularity. This increased persistence was probably apparent only.

The animals on a strict oatmeal diet did not live long enough to enable a complete experiment to be carried beyond 8 or 10 days. The organism could not be recovered in any case after 16 days. Judged by the amount of green color produced in the culture, the number of surviving organisms became progressively less the longer the interval following the cessation of its ingestion by mouth. It was probable on the basis of these experiments that there was an effect of dietary deficiency which consisted in the depression of a normal mechanism controlling the implantation of extraneous bacteria in the gastrointestinal tract.

A BRIEF REPORT ON LACTIC ACID MILK.

DR. DEWITT H. SHERMAN, of Buffalo, gave a report on some original work that he and his associate, Dr. Harry R. Lohnes, had been doing this last winter on lactic acid milks.

As a therapeutic food of many years standing he discussed the various accepted reasons for its beneficial effect. At first the good results were supposedly due to the Bulgarian bacillus. This idea has been stated to be incorrect. The second reason was that the increased acidity of the gastric contents as it passed into the duodenum stimulated the intestinal secretions. This has been put aside. The third reason, which at present seems most rational, is that lactic acid is efficient through Meltzer's law of "Contrary Innervation"; that it is productive of good results through the increased amplification of the peristaltic wave, and by this increased motility function is increased.

In the infant, Meltzer's law is especially applicable because lactic acid milk seems to act best in those cases that are undertone, with weakened or dilated gastric musculature.

He compared the relative value of protein milk with lactic acid milk and showed some of their differences. He questioned the extolled value of protein milk because its soluble salts were removed and its insoluble salts, those of calcium and magnesium, were in excess. He appreciated the value of protein milk in those infants whose tolerance for sugars is broken. He laid stress on the acidity of the lactic acid milks as a reason for the infants refusing it or rejecting it. The desired acidity he placed at 70 to 90, as measured by a decinormal sodium hydrate solution.

To keep this acidity, he gave 2 original methods for making

lactic acid milk. The first was to culture the boiled and hence sterile milk and put it away, at a temperature of 85° F., in an ordinary child's icebox so commonly found in the household. It was to remain there over night, and in the morning would be found of approximately the correct acidity. It was then to be boiled again to destroy the activity of the Bulgarian bacillus, and put away on the ice.

The second method was even simpler. Culture the boiled milk, allow it to stand in a warm place, and in 24 hours the acidity would reach 180 to 190, possibly 200, an acid reaction of sufficient degree to destroy the Bulgarian bacillus. Dilute this very acid lactic acid milk with an equal amount of sweet milk and the correct acidity is secured. Upon adding the 2 a fine clotting occurs, and when boiling the second time active stirring with a Dover egg-beater is essential to retain a homogeneous mixture.

As regards the fat content and to make the formulae flexible in reference to fat, a skimmed lactic acid milk was first used, and as indications permitted whole lactic acid milk was gradually substituted for it.

THE URGENT NEED OF DIETETIC REFORM AND THE
DUTY OF THE MEDICAL PROFESSION TOWARD
ALL THE YOUNG OF THE NATION.
NEURODYSTROPHIA AMERICANA.

DR. E. W. SAUNDERS, of St. Louis, read this paper: Case 1. Hazel S., seen with Dr. Poe, 10 years old, well proportioned, good muscular development, perfect teeth, no history of injury; lues and alcoholism excluded. Recent history: Four weeks previously began to complain of pains in the legs. Was under the treatment of various physicians, and of Dr. Poe for several days past. The pains became so severe as to cause screaming, and anodynes were given. Recently pains extended to the arms; never affected the head or trunk. Status praesens: Careful examination revealed normal condition of all viscera, glands, bones, mouth, and nose and accessory cavities. Passive motion not painful. All functions normal; appetite good; temperature normal. Dr. Main on x-ray examination, reported perfect condition of the teeth, erupted and non-erupted. Tonsils negligible. Spinal cord and intercostal nerves painless on pressure. No tenderness along the course of

the nerves of the extremities. No form of rheumatism in evidence. Knee jerks present, but tardy on first visit, absent on second visit; increasing weakness of the legs, although walking was still brisk during morning hours. Superficial reflexes normal. Etiologic history: Family removed to the city 6 months previously from the farm, where the children were fed on natural corn meal and soda biscuit, cabbage, potatoes, fresh butter and milk, eggs occasionally, pork and some fresh meat. Since living in the city, although the father earned good wages, from sheer ignorance of the mother and perverted taste on the part of the child, the diet was changed to white bread, white rice, commercial corn meal, cookies and candy, with potatoes and meat, chiefly pork, eggs very rarely, no greens and no butter, as the child refused to eat creamery butter, milk in small quantities, apples eaten every day. She had always been most strenuous at play and continued to be so until a few days before I saw her, during the morning hours only. Differential diagnosis: Lues, alcoholism, scurvy, rickets, acute fatigue-myositis (of Filatov), rheumatism in all its forms, periostitis, osteomyelitis, ordinary neuritis from exposure, reflex pains from focal irritation, focal infections, poliomyelitis, could all be excluded by the history and present findings. Diagnosis by exclusion. "Neurodystrophia Americana," confirmed by results of dietetic treatment. Diet: Natural grain foods exclusively. Greens with fat, vinegar and yeast. Abundance of butter, yolks of eggs, malt extract, citrous fruits. Medicinally, glycono-phosphates. Absolute rest in bed. Within 3 days, or nights rather, there were no more screaming pains, and within a week, no pains whatever.

Case 2.—Richard R. brought to my office July, 1919, age 5 years. Etiologic history: Six months before he had been the leader of his companions in all strenuous play. Gradually he lost his leadership until he would sit down and watch the other children at play. Became peevish, disobedient, unreasonable; his mother was greatly afflicted by the complete change in her child. Appetite nil, except for puffed rice, which was eaten three times a day, with cream and sugar. The legs grew progressively weaker until the child fell down a flight of steps on 2 occasions. Aching in the early part of the night, in the legs only, gradually becoming so severe that his screams disturbed the family. Status praesens: Child pale, somewhat wasted, listless, complaining every moment,

combative to the last degree. All organs and functions normal, and all known etiologic diseases excluded. Legs very weak, knee jerks absent, superficial reflexes present, temperature normal. Poliomyelitis excluded by history and subsequent course. The anxious mother was told that the diagnosis was "American beri-beri," and that diet would restore the child completely. However, the treatment proved more difficult and protracted than that of any of the cases which I have treated, owing to the psychic attitude of the child. In order to introduce the proper food the stomach tube had to be used internally, and the switch externally, and even so the case proved very refractory. However, the pains speedily ceased and the strength slowly returned to the lower limbs, although the tendon reflexes had not returned when I last saw him. Every morsel of proper food had to be administered by persuasion or force.

Case 3.—John D., 5 years of age. Originally a very strong and wholesome child, tireless at play. He had within the preceding few weeks developed an inordinate appetite for sweets and devitalized foods generally, eschewing most of the wholesome articles of diet. He was anemic and tired looking. The invariable history of severe "growing pains," occurring every night after strenuous play. The mother was told that her fine boy had American beri-beri, owing to her faulty feeding and that diet would soon restore him. He was put to bed and after a few days allowed to play in the forenoon only. The usual restorative diet was ordered. The child coöperated well and recovery was prompt. The knee jerks returned vigorously within a month.

These 3 cases are not exceptional. They might be multiplied greatly. I might also cite some instances of similar effects in adults, fed upon the same insufficient diet, although in them the use of tobacco, sometimes alcohol, hard labor and exposure to weather, might vitiate the conclusions. I earnestly hope that this short recital may stimulate many pediatricians to make extensive researches in this direction.

HAS MALT SOUP EXTRACT AN ANTISCORBUTIC VALUE?

DR. HENRY J. GERSTENBERGER, of Cleveland, reported that while studying the respiratory quotient of scorbutic infants, it was decided for definite reasons to feed these infants with Keller's

Malt Soup, a mixture which had made for itself a record of producing and never curing scurvy. During this study, 3 infants with marked and severe scurvy recovered unexpectedly on a diet of malt soup extract in a rapid and complete manner. Dr. Gerstenberger discussed the factors that might have influenced the antiscorbutic content of this special lot of malt soup extract.

Discussion.—DR. JOSEPH BRENNEMANN, of Chicago, discussed the difficulty of explaining why some food cured scurvy and others did not and why some children were cured by almost any change of diet. It seemed that individual susceptibility was a large factor. The more one learned about scurvy the more keenly he felt that the present hypothesis failed to explain many things in connection with scurvy. Again, the question might be asked how one was going to diagnose scurvy in mild cases if there was no involvement of the gums or if the child was cutting teeth. When it came to the question of the rosary that might be present in either scurvy or rickets.

DR. J. P. CROZER GRIFFITH, of Philadelphia, said that those who had been long members of the Society would remember the oft quoted statistics of their collective investigation upon the cause of infantile scurvy. In this there was nothing that became more apparent than that there were various different dietetic conditions which were capable of producing the disease. Some children developed scurvy on pasteurized milk, some on boiled milk, and some on raw milk. Some recovered when pasteurized milk was changed to raw milk and some, curiously enough, when raw milk was changed to pasteurized milk. Quite a number developed scurvy on breast-feeding. It seemed in the report of the committee that the only conclusion justifiable was that there was something wrong with the diet, but just what this dietetic error was did not appear clear. It was beyond question, however, that there must be besides diet a peculiar disposition to develop scurvy seen in a comparatively small number of infants. If this were not the case we would find all the infants fed on a certain mixture or proprietary food developing the disease. Thousands of children were receiving without damage the identical food which in some instances was followed by scorbutus. Dr. Griffith stated that malt soup had been a favorite food with him for many years and he had not seen more than 2 or 3 cases develop scurvy in spite of the fact that no orange juice had been administered. It was again evident

that there was some element other than diet, and malt soup was not to be blamed more than any other foods.

DR. THOMAS S. SOUTHWORTH, of New York, said he thought this subject should be very thoroughly discussed before the impression was conveyed that malt soup extract was an antiscorbutic. In one institution they had used it quite steadily for some years because they obtained better results than from lactic acid milk. In making it up they had used pasteurized milk and cooked barley, and had added the malt soup to it, suiting the preparation to each individual child. They had had repeated outbreaks of scurvy when the management of the institution had failed to provide sufficient orange juice or tomato. It was absolutely imperative that infants receiving malt soup should have orange juice or tomato in considerable quantities.

DR. GERSTENBERGER agreed with Dr. Southworth that it would be a mistake to give the impression that malt soup extract was an antiscorbutic. He had merely reported the cases because they were interesting and suggested the possibility that a malt preparation might be manufactured that possessed antiscorbutic properties, and that possibly growing the barley longer might have something to do with it. The most plausible explanation of the cure in these children was that this one lot of malt soup extract happened to have this property.

MEDICAL SUPERVISION OF THE BOARDED-OUT CHILD.

DR. MAYNARD LADD, of Boston, described the work of the Boston Dispensary, which was started in coöperation with the Boston Children's Aid Society and the Church Home Society, 2 of the large child-placing agencies, to demonstrate two principles: 1. The value of expert continuous supervision of children in the care of child-placing societies. 2. The value of utilizing for the purpose the equipment and medical staff of an organized dispensary, including specialists in all the chief branches of medicine, in surgery, and in clinical and x-ray laboratories for modern medical diagnosis and treatment.

After describing the organization of the Preventive Clinic, Dr. Ladd presented a statistical study of 876 individual children. About 500 a year were cared for. Of these, 15 per cent. were

sufficiently ill from one cause or another to be admitted to the children's hospital wards, which might be taken as a fair estimate of the hospital requirements of such a group of children. A little less than one-third of the hospital admissions were for necessary tonsillectomies or adenectomies. The low death rate of 1.1 per cent. undoubtedly was influenced by the prompt detection of serious cases of illness and the facilities provided for early and, if necessary, prolonged hospital care. The mortality statistics were interesting in the proof they offered of the practicability of reducing the death rate of a supervised group of children to a point below that which was accepted as normal for the community. There was a total of 17 deaths in 3 years among 1,551 cases, amounting to 1 death per year for each 100 children under their care. Equally interesting were the figures showing the effect of the special feeding clinic in the nutritional development of the first and second years. All the babies were fed on modifications of cows' milk prepared in the foster homes and supervised by visiting nurses under medical direction. Seven-tenths of these gained in weight considerably above the normal rate of the average healthy infant and three-tenths only failed to reach the normal rate by a small margin.

The conclusion justified from this experience was that with proper organization and intelligent direction the boarded-out baby, even though deprived of its mother's milk, was a perfectly good medical risk, and need not be deprived of its fair chance in life. Incidentally, the clinic might be said to have demonstrated also the possibility of such medical supervision for all children, and the value of aiding it in an organized way. Expert pediatric service ought to be made available to all children, but it was not and could not be unless organized on some institutional basis and made available on the payment of a moderate fee.

This clinic provided what every child ought to have but few received: 1. A complete physical examination when accepted by the society. 2. Correction of defects which had interfered with proper nutrition and development. 3. Prescription and supervision under trained nurses, of proper diet, especially infants and children in the second and third years. 4. Provision for meeting promptly cases of acute illness occurring in foster homes and for transferring cases to hospitals. 5. Examinations on discharge with analysis of the history of the child under this care and trans-

mission to parents and guardians through agency of social service of the data in regard to the child's state of health and the subsequent care he should receive.

A TWENTY-FOUR HOUR SCHEDULE FOR BOYS.

DR. RICHARD M. SMITH, of Boston, recalled that in a previous communication, "A Health Study of a Boys' School," he had drawn attention to certain fundamental principles with reference to the care of the health of school children and pointed out lines for the further extension of health supervision. There was reported a table of the distribution of the boy's time during school hours between study, activity and inactivity. They were now convinced by a further use of the table that it gave a correct distribution of the boy's time.

The parent, the physician and the teacher were together responsible for the child's life and no part of that life could be arranged intelligently without the coöperation of all 3 individuals. For instance, the child's physical environment, such as buildings and fresh air, was dependent not only upon the proper sanitation of the school building, but also upon the room in which he slept at home. His nutrition was maintained not only by the school lunch and the dinner received at school, but also by the breakfast received at home. His educational work in school must be arranged, bearing in mind not only the studies necessary for the school curriculum, but also whether or not he was doing work at home, such as music and languages. His exercise was made up of what he did at home in the afternoon quite as much as upon the carefully arranged athletics at school.

During the last year at the Rivers Open Air School for Boys a study was made of the weekly 24 hours distribution of the time of the boys. The matter of time distribution and the question of instruction were the 2 most important factors in the health of school children. There was no means at present of determining whether a given child was distributing his time in conformity with a healthful management. A table presented demonstrated what appeared to be a healthful division of the hours of the week. The data was obtained from the actual school schedules and statements of the parents concerning time spent at home. These tables showed that a boy of 6 years spent about 40½ hours per week in

study and exercise, and $127\frac{1}{2}$ in recreation and sleep; a boy of 8 years spent $48\frac{1}{2}$ hours in study and exercise and $119\frac{1}{2}$ in sleep and relaxation; a boy of 10 spent 55 hours in exercise and study and 113 in relaxation and sleep; a boy of 12 spent $62\frac{1}{2}$ hours in study and exercise and $105\frac{1}{2}$ in relaxation and sleep. These figures represented what an average healthy boy of a given age could do who was taking enough school work to advance in his grade and who was having sufficient exercise to keep in good condition. It was possible for a child to have a schedule different in every respect from this average, yet be in normal health, and progress satisfactorily in school. Such a child was obviously unusual and certainly could not be taken for a model for others to follow. Dr. Smith believed the principles involved in these tables were correct and hoped they would be used sufficiently so that correct principles might be inserted if those given needed modification. The study represented coöperative effort on the part of the teacher, parent and physician to plan the entire program of the child as a unit, giving equal consideration to education and health.

A STUDY OF BREAST FEEDING IN THE CITY OF MINNEAPOLIS.

DR. JULIUS P. SEDGWICK, of Minneapolis, described a plan to encourage breast feeding that he had been instrumental in putting into effect in Minneapolis. The work fell into 2 parts: 1. That of maintaining breast feeding. In their private work and in the clinic they had been using certain principles described in a paper presented before the American Medical Association in 1917 for maintaining and increasing the supply of breast milk. They wished to see if these principles could be applied on a larger scale. 2. They wished to ascertain what statistical results they could show by a wider application of these principles as to the proportion of mothers nursing their babies and the effect on infant mortality.

In order to maintain and promote the milk supply they had used the well-known methods, paying special attention to that of making a demand upon the breast by expression. This he felt was the most important factor in maintaining the supply of breast milk and that it had enabled them to accomplish a great deal.

The technique used in expression of the milk was not that of going over the whole gland tissue and using massage but simply of emptying the sinus back of the colored areola. Expression was used for premature infants, where the mother had poor or inverted nipples, sore breasts, or if for any reason the baby could not take the breast and they wished to maintain the milk supply.

The other part of carrying out their plan consisted in reaching the public. This they had done by gaining the coöperation of the medical profession, the health department, the Infant Welfare Society and that of prominent citizens. The mother of every baby born in Minneapolis during the year was either seen by a representative of the organization or reached by mail or telephone. Each mother was given information and literature. Each mother was followed and seen or heard from every month or oftener if necessary. As a result of this work, 96 per cent. of the babies born in Minneapolis were on the breast, and the mortality had dropped from 71 to 65 per cent. for that year.

THE FATE OF SUBCUTANEOUSLY INJECTED RED BLOOD CELLS.

DR. ROOD TAYLOR, of Minneapolis, stated that former experimental work had proved that subcutaneously injected red blood cells are qualitatively capable of reaching the recipient's circulation. In this work the usual clinical methods were employed to show that the subcutaneous injection of large amounts of homologous citrated blood into infants produces a decided hemoglobin increase. Using Ashby's method of differential red blood cell counting, the writer then determined that following subcutaneous injection of homologous citrated blood there was no marked absorption of injected corpuscles into the recipient's circulating blood.

THE CIRCULATORY SYSTEM IN NUTRITIONAL DISTURBANCES.

DR. W. MCKIM MARRIOTT, DR. H. MCCULLOUGH and DR. K. UTHEIM, of St. Louis, made this contribution which was presented by Dr. Marriott. He stated that in that particular nutritional disturbance known as athrepsia or marasmus, it was very evident clinically that some changes in the circulation had oc-

curred. This was recognized by the low surface temperature, slow pulse and grayish color of the skin. It had seemed desirable to estimate quantitatively the degree of circulatory changes and, if possible, to determine the cause of the changes.

In measuring the circulation, they had used the colorimetric method of Dr. G. N. Stewart. Before applying this method to infants they had applied it to animals and compared the results with those obtained by the Ludwig-"Strohmuhr." The method was easily applied to infants. In a series of 29 normal infants, the average flow of the blood was 17.2 c.c. per 100 c.c. of arm per minute. In applying the method to 35 athreptic infants, the volume flow of the blood was found to be greatly diminished, sometimes being as low as 1 or 2 c.c. per minute. As these infants improved the volume flow of the blood increased and in some instances became normal.

The next question to answer was regarding the cause of the decrease in circulation. One cause of diminished volume flow of the blood is known to be a decreased blood volume. The next step was to determine the blood volume of normal and athreptic infants. In a series of normal infants, the average blood volume was 9.1 per cent. of the body weight, the variations being from 8 to 10.8 per cent. The average blood volume of a number of athreptic infants studied was 8 per cent. of the body weight. One showed as low as 4.8 per cent. As adipose tissue is a relatively non-vascular organ, none would expect a thin infant to have a larger amount of blood per kilo of body weight than a fat one. They found the reverse to be often the case. This indicated a definite decrease in the volume of the blood. The lowered blood volume was sufficient to account for the low volume flow in at least some of these infants. Other factors, however, seemed probably to be operative. The peripheral volume flow of the blood would be increased if capillary or arteriolar constriction had occurred. They found such a constriction to occur in these infants. This was shown by the fact that there was a piling up of the blood corpuscles on the capillary side. Blood obtained by a prick in the skin of these infants showed a distinctly higher hemoglobin in red and white cell counts than blood obtained directly from the veins. This constriction of the arterioles leads to poor peripheral circulation, and probably to the gray color of the skin. It also accounts for the fact that some of these extremely athreptic and apparently

anemic infants have normal red blood cell counts when determinations are made on capillary blood.

They considered the arteriolar constriction as a compensatory mechanism to maintain blood pressure when the blood volume was diminished. They found this mechanism ordinarily sufficient to maintain the blood pressure as they very rarely observed low blood pressures in the athreptic infants studied. Having considered the changes in the blood and in the vessels, they next turned to a consideration of the heart muscle itself. This, it might be expected, would atrophy with the rest of the body, but at post mortem very little change in the heart muscle could be made out. It is possible, however, that functional changes might occur. To determine whether or not such was the case electrocardiograms were made and in a certain number of the infants, definite changes in the functional activity of the heart muscle were demonstrated. The variations from the normal most frequently observed were low amplitude of all waves. The P and T waves were frequently absent, especially in leads one and three. The P-R time was found to be as long as 0.2 seconds, and the Q-R-S time was frequently prolonged. The ventricular complexes were occasionally abnormal in form, the R wave especially being notched. With improvement in the clinical condition of the patients, the form of the electrocardiograms changed, and this suggested that the alterations in the heart muscle were functional rather than organic. They suggested that poor circulation through the coronary arteries was in part responsible for the changes, a vicious circle being thus established.

Some experiments were done on animals in an attempt to reproduce the athreptic condition. After a period of complete starvation the blood of rabbits was found to be definitely decreased, and also the volume flow. When the animals were again fed, they maintained a constant weight for a considerable period of time until the blood volume slowly increased. After this the process of repair became more rapid. In some animals the blood volume did return to normal and these animals failed to recover their weight and finally died.

RECENT STUDIES IN BLOOD NITROGEN OF INFANTS AND CHILDREN.

DR. FREDERIC W. SCHLUTZ, of Minneapolis, presented this

study which had for its object the establishment of normal figures for the non-protein nitrogen content of the blood in infants and older children. Practically no complete studies on normal children were available; such figures were, however, available for normal adults as the result of the work of Professor Folin. Determinations of total nitrogen, urea, uric acid, creatinin, combined creatin and creatinin and of blood sugar were made. The amino-acid fraction was also being studied but the results were not yet ready for presentation.

The methods used were those of Folin. The DuBoscq calorimeter was used throughout. An effort was made to have the material as nearly normal as possible. The blood was taken from the head sinus in infants under 10 months and from the median basilic or external jugular in older children. Ten c.c. was usually taken, which was sufficient for all determinations and even allowed of repeating some. All determinations were carried out within 24 hours. The blood was taken from 2½ to 17 hours after the intake of food. The children were arbitrarily divided into 5 age periods as follows: from 1 to 6 months, from 7 to 14 months, from 2 to 6 years, from 7 to 10 years, from 11 to 14 years. There were in all 88 cases. A chart indicated the maximum and minimum figures for the different age periods, and there were all gradations between. The total nitrogen ranged from 24.90 to 41.10 mg., the average being between 32 and 34; for adults Folin and his co-workers found from 2 to 34 mgs. The urea ranged from 10.80 to 20.40 mg., the average being about 15.50 mg.; for adults the average was between 10 and 23 mg. The uric acid ranged from 0.55 to 4.75 mg., the average being about 2 mg. plus; the average for the adult was from 2 to 3 mg. Creatinin ranged from 1.110 to 2.055 mg., the average being about 1.4 mg.; the average for the adult was 1.1 to 1.3 mg. The creatin and creatinin ranged between 4.74 and 8.92, with an average of 6.5 mg.; the average for the adult was 6.5 to 9.5. The blood sugar percentage ranged between 0.05 and 0.14 per cent., with an average of about 0.09 per cent.; the average for the adult was between 0.06 and 0.12 per cent.

These figures, Dr. Schlutz believed, corroborated for the periods of infancy and childhood the findings for normal adults, namely, the constancy of the non-protein nitrogen excretion. This was true for all the components except for uric acid which showed

the same variability it showed in adult blood. The study supported the explanation of Folin and Denis that the normal kidney maintained a constant level of non-protein nitrogen and urea in the blood. The figures found in infancy and childhood approximated very closely those found in adult blood and held for all age periods.

In a study of the blood in reference to these substances in constitutional diseases, a normal blood picture was found, especially in respect to the uric acid content, which agreed with the results of Liefman. A high total nitrogen and urea figure was found in asthma, but there was no good explanation for it.

Observations were carried out on a large series of pathological cases, the results of which showed in the absence of marked hyperpyrexia, and any kidney involvement figures for the different components about the same as in the normals. This was in agreement with the results found by Leopold and Bernhard and a recent extensive study by Chapin and Meyers.

ELECTROCARDIOGRAPHY IN CHILDREN.

DR. FREDERIC W. SCHLUTZ and DR. MAX SEHAM, of Minneapolis, in this paper covered, first, the physiologic peculiarities of the normal electrocardiograms of all ages of childhood, including the premature, from 1 hour to 13 years; second, the pulse period in 50ths of a second in all ages; third, the transmission time of both auricle and ventricle; fourth, diseases peculiar to childhood.

The electrocardiogram at birth was constant. All of the newborns, 22 in number, showed similar curves. A right ventricular preponderance was characteristic, showing a deep S, and a high R_s. During the first 3 months this form persisted. During the fourth month the S became smaller than the R in Derivation 1, signifying a change from right to left ventricular preponderance. From the fourth month to the end of the first year, it gradually changed into the adult type. From the first year on the adult characteristics persisted.

In the premature the form of the electrocardiogram was incomplete. All of the deflections except S were not seen. After birth all of the deflections in both the auricular and the ventricular complex were well established, and in practically all instances showed on the tracings.

The pulse in new-borns was quite regular as was shown by the electrocardiogram. Sinus arrhythmia was not complete until the school age. From this time until puberty it occurred in about 50 per cent. of all normal children.

By measurement of the P-R intervals and the R-T intervals the transmission time could be accurately studied. The average P-R in new-borns was 0.10 of a second, from two to five years it was 0.12 of a second, and from 6 to 13 years it was 0.28 of a second. This included the Q-R-S period which in the respective ages was from 0.03 of a second to 0.09 of a second.

The electrocardiograph was not only of value in pediatrics for the normal, but it was a great aid in diagnosis in abnormal conditions. A study of 22 congenital heart lesions, 2 of which came to autopsy, showed that only in cases in which the right side of a heart was involved, especially pulmonary stenosis, there was a characteristic right ventricular preponderance shown. In 7 of 11 drop hearts, all of which were confirmed by x-ray the ventricular complex in lead 1 was unusually low. Exudative diathesis decomposition, hypertrophy of the heart when unassociated with heart murmur spasmophilia, tuberculosis of the lungs, and other miscellaneous diseases were studied in 300 cases.

PYLORIC STENOSIS IN INFANCY (Annals of Surgery, May, 1919, p. 531). F. O. Allen, Jr., cites a case in which he operated when the baby was three months old. Instead of the usual tumor, he found a distinct plication at the pylorus, the duodenum bent forward and adherent to the stomach for a distance of almost a quarter of an inch. The area was hyperaemic and there were definite cobweb adhesions. Allen divided the adhesion with scissors, and straightened out the pylorus.—*Journal A. M. A.*

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ORIGINAL COMMUNICATIONS

THE EFFORT SYNDROME IN CHILDREN*

By CHARLES GILMORE KERLEY, M.D.,

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It has long been my observation, that children divide themselves into groups as relates to their individual characteristics. This tendency to grouping is not discernable to any extent among infants. After the second year, individual traits, and a distinct personality manifest themselves. At about this period the child begins to individuate.

During the late international war, English army surgeons learned, that, when certain recruits were put to prolonged hard work, at drill, hikes, and other exertion, they failed to measure up

*Read before the 32nd Annual Meeting of the American Pediatric Society, held at Hyde Park, Chicago, Illinois, June 1, 2 and 3, 1920.

to the endurance standard required of a soldier in the field. These recruits had passed the various physical tests, and had been put to training. After a time it was found necessary to disqualify the men, because of inability to perform the duties and bear the hardships demanded, which others were able to meet. To this condition, Dr. Thomas Lewis applied the term "effort syndrome."

As the most prominent symptoms involve the circulatory and nervous system, later writers have used the term "neuro-circulatory asthenia" or "neuro-circulatory myasthenia" (MacFarlane). It was found that in some individuals the disability was due to infection from the tonsils, teeth or other foci. Other cases apparently were of endocrine origin. To describe the condition, as it occurred, in a great majority of soldiers, Lewis applied the term "constitutional." Friedlander and Freyhof, in the *Archives of Internal Medicine*, December, 1918, reported on 50 cases of so called "constitutional neuro-circulatory asthenia." Robey and Boas (*Journal of American Medical Association*, August 17, 1918) after an intensive study of a large number of soldiers, suffering from neuro-circulatory disorders were obliged to recommend for permanent discharge 87 per cent. These cases all belonged to the so called "constitutional" class.

The boy or girl who may qualify for the "effort syndrome" class, comes to us with a typical story, which, condensed, means that there is an absence of capacity for sustained effort, both mental and physical. It is stated that the child is backward in school, behind in his classes. He is intelligent, but cannot apply himself sufficiently to become an average student. In like manner, he is physically unfit for the usual activities of boyhood. He tires readily and prefers to be a spectator rather than an active participant in games and other amusements. Wherever endurance is required, he fails. If he attempts, in later life, to make the foot ball or base ball team, he is turned down by the coach or trainer. Nevertheless, he is not ill, and even upon a very thorough physical examination, will fail to show disease.

The weight and height apparently have little to do with the condition. In my case records, this type of child has been heretofore classified as a poor individual. One of the distinguishing characteristics is a lack of nervous control. The individual boys and girls of this type are subjected to a good deal of unjust criticism. They are accused of being lazy, indifferent, careless and

dull. The fact is, they are poor types of humans, of from 50 to 75 per cent. capacity.

It is important not to confuse these young people with those who suffer from bad habits, as regards their sleep, rest and general hygiene, or with those who are bodily ill, or with those, who, because of rapid growth and arduous duties, are temporarily but not permanently below normal. With suitable management in such cases, there will always be a sustained response. It can be readily understood that in girls the above mentioned constitutional peculiarities may attract less attention and be more readily excused when present.

CASE 1. A young man, now 23 years of age, came under my care at the age of 6 months. He was the oldest of 3 children and the only boy. The father was in fair physical condition, the mother was delicate in the sense that she had very little resistance or stamina. Frequent rest cures were necessary. She had backaches and headaches habitually, was nervous, thin and pale and always had been a care to her parents. The boy had the usual illnesses of childhood. He suffered considerably from digestive disturbances in the early years. He was irritable at home and rather unhappy at school. His school life proved very strenuous and was interspersed with frequent intermissions for one cause or another. Mental control was defective. Tantrums were not unusual. As he grew to older boyhood, various boarding schools were attempted, but he never remained longer than the Christmas vacation. It was uniformly found by the head master, that the school was not suited to the boy.

When the United States entered the war, he volunteered in a certain department and was accepted, passed the physical examination, and remained a few weeks. He was then advised by the commanding officer, that he would do better work in another division of the service. Thither he went and was examined and again accepted, but in a short time was advised to apply to another department. Again he was accepted and again he failed. The boy was anxious to enter the service, as all his friends had volunteered and 2 younger sisters made his life miserable by their anxiety to have a big brother hero. It was absolutely impossible for this boy to do the work required of him in any of the positions he attempted, although he was most anxious to serve.

These individuals finally drift into the right occupational sphere, one that requires very little expenditure of effort.

CASE 2. A boy who was a fine physical specimen, was frequently ill. He had a tendency to be introspective and moody. He did not like school and could not get along very well with the other boys. His school attendance was interrupted by headaches, attacks of indigestion and various nervous disorders; he was inclined to hysteria and brain storms. When he was 12 years of age, he was ashamed to go to school, because he was so far behind others of his age. With private tutoring, he was able to enter the primary department of a large boys school, at the beginning of the autumn term. Just before the Christmas holiday, the mother had a letter from the head master, telling her that in his opinion their particular school was not suited to the requirements of her son. Study made his head ache. Work in the garden produced dizziness. As a young lad he would ride his bicycle down hill 2 miles to the village, and pay some public conveyance to take him and the bicycle home. He suffered from palpitation if he rode up hill on his bicycle. He is a well meaning, well spoken, kindly disposed young man, without a trace of initiative. He has tried very hard to be a real boy, but he tells me he cannot, and it has caused him a great deal of worry. Thousands of dollars have been wasted on him up to date. The mother was 46 years old when the boy was born and the father 50.

CASE 3. A young man of 20 years is still in the preparatory school, preparing for college. I have known this boy since he was an infant, and have exerted all the influence I possess, to have him give up the college idea and go into business. His friends are all in college, and there only will he be happy. He enjoys fairly good health but has never been known to take part in any sport. He prefers to be a spectator. Exertion makes him nervous and any unusual event causes him to remain in bed the next day. He is totally devoid of initiative. The mother of the boy is an habitual invalid, but is never very ill. The father is an unusually able business man.

CASE 4. A girl, 18 years of age, large, well formed, mentally alert, is in school about half the time. She has frequent headaches and backaches and tires easily. Other girls make her nervous. Parties tire her. An evening of dancing could never be considered.

The girl is normal physically and has been examined and treated by a goodly number of physicians. I have known her since she was 2 years old. She always has been and always will be just useless.

These few cases are given simply as illustrative of the type. Similar cases and other less pronounced exist in all communities, and all have one feature in common—a lessened capacity for sustained effort. From the standpoint of treatment, they constitute a most discouraging group. Rest cures, change of climate, and various supporting measures are of little avail. As these individuals are fashioned, so they remain.

The poor individual exists throughout the entire animal world. Among the lower animals, those of defective capacity, for economic reasons, usually have a short career. The defective functioning human, if well born, is urged and forced and stimulated to accomplish that which is not in him. *It is impossible to get out of any piece of machinery, work which the machine was not intended to accomplish.* Millions of dollars are wasted on youths who are physically and mentally unable to meet the standards set up by ambitious parents and friends, in an effort toward their so called higher education. The highly trained teaching talent of our preparatory schools and universities is wasted in part on poor student material, 25 to 50 per cent. of which should be scrapped and put to productive occupation. Before a boy is permitted to avail himself of unusual educational advantages it should be determined *that he is worth it.* The high school and the preparatory school should serve as a clearing house. In addition to the mental attainments required for a college entrance, it should be required that a candidate submit testimonials as to physical fitness and mental capabilities from the head master or high school principal.

What is needed, for economic reasons, is expert occupational diagnosticians, who will aid in placing the boys at work to which they are fitted. I have had the opportunity to keep in touch with a great many boy patients, through manifesting an interest in them, and have been able to advise and assist them along occupational lines. A boy, who belongs in the class we are discussing, should discontinue school in the fifteenth or sixteenth year and take up business. In order to make a reasonable success, the occupation must be one that is not strenuous. Such boys often make fairly good salesmen, clerks and bookkeepers. They never get very

far however, as they belong to that considerable class who watch the clock. Advancement in salary, partnership, etc., go elsewhere.

It is exceptional to find children of this type the offspring of strong, vigorous young persons. In a great majority of the cases, they are the offspring of a weakly mother; the mother of little resistance, of lessened endurance capacity. A strong vigorous mother will do much to offset the unfavorable influence on the progeny of a weakly male. The progeny of vigorous males is greatly handicapped by inferior mothers. All of which applies to the lower animals as well as the human. Frequent child bearing has apparently been a factor in some instances. By far, however, the chief cause of the 50 to 75 per cent. individual, is a mother of lowered resistance, of inherent weakened constitution and inability for sustained effort, which defects she transmits to her offspring. The necessity for a great deal of attention to the physical development of those who will some day be mothers, is a very urgent need.

COMMENT.—There are constitutionally inferior, substandard (MacFarlane) children. Thus constituted, they enter the world and thus they continue throughout perhaps a long life regardless of attempts at improvement. A trait common to all is inability for sustained effort. Physicians and educators and all interested in the development of the young, should appreciate, that what often passes for indifference, indolence, and inattention may be of constitutional origin and impossible of correction. Where such is found to be the case, the child's curriculum should be made to fit the child and not the child to fit any cut and dried curriculum. All such attempts mean energy wasted.

SURGICAL LESION FROM ASCARIS (Hospitalstidende, Jan. 8, 1919, p. 38). A. Moller's patient was an infant of 22 months under treatment for ascarides. In one week he passed seventy. Then symptoms of peritonitis compelled laparotomy, and an ascaris was found in a pus pocket, but this pocket was encapsulated and there was no peritonitis. The toxic effects of the masses of ascarides were long felt. He was brought back to the hospital four months later with further masses of ascarides. A second course of santonin has apparently banished them completely.—*Journal A. M. A.*

THE DIETETIC TREATMENT OF SUMMER DIARRHEA*

By J. P. CROZER GRIFFITH, M.D.,

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Philadelphia.

Only a year ago it was my privilege to take part in a symposium upon summer diarrhea, read before this Society, and to discuss a topic covering that which is assigned to me for this evening. Nothing new upon the subject has appeared in medical literature, so far as it has come to my notice, and I can only reiterate and emphasize what was said on that occasion.

The term "summer diarrhea" is a broad one and covers more than one clinical and pathological affection. We might better speak in the plural of "summer diarrheas." The treatment consequently varies to some extent, depending upon the nature of the disease—whether we are dealing with the simple congestive condition of acute intestinal indigestion; some one of the forms of acute intestinal intoxication with its degenerative changes; or the inflammatory process of ileocolitis. Yet to a certain extent the treatment of all of these can be considered at one time. It resolves itself into (1) prophylactic, (2) dietetic, (3) hygienic, and (4) medicinal and local. It is my province to discuss the first of these, so far as diet is concerned, as well as the dietetic treatment of the attack itself. It is impossible to avoid entirely some reference to certain allied therapeutic procedures.

(1) *Prophylactic.* Acute intestinal indigestion and acute gastroenteric intoxication are the most frequent varieties of diarrhea in infants, and, inasmuch as inflammatory forms usually develop as a sequel to these, prophylaxis as applied to them will generally include that of any other diarrheal disorder. Prophylaxis is of the utmost importance. Very numerous statistics from different countries agree in the much lesser mortality among breast fed babies as compared with those who are bottle fed. They agree, too, that a large proportion of deaths in infancy, and especially in the first year of life, are dependent upon gastrointestinal disorders. George Still estimated that from 2000 to 4000 infants, under 1 year of age, died annually in London from diarrheal diseases, and Hermann, that over 33 per cent. of the deaths in the 1st year in Berlin were to be assigned to digestive disturbances.

*Read at a Symposium before the Philadelphia Pediatric Society, May 11, 1920.

It has been shown further that deaths from this cause in infancy occur predominatingly in artificially fed subjects. In general terms, the artificially fed infants show 5 times the mortality seen among the breast fed. The inference is obvious. The very best method of prophylaxis is to insist upon breast feeding whenever this is possible. It is possible much oftener than supposed. Far too frequently early weaning is solely the fault of the obstetrical nurse or of the attending physician. Too early discouragement must not be felt and yielded to, merely because the breast milk seems insufficient or appears to disagree. It happens many times that both of these difficulties will disappear when the colostrum period is over, and the mother is up and is following her usual method of life. Encouragement given to the mother by the physician counts for much. Many a mother has lost her milk merely because she worried lest she should lose it. Moreover, a little breast milk, helped out by the bottle, is far better than none at all, and weaning should never be permitted merely because the mother's secretion is scanty. If we can bring the baby through the first 3 months of life with breast feeding, we shall have made a good start, and the infant will be less susceptible; although, of course, the longer we can maintain breast feeding during the first year, the better it is for the child. Again, when the time of weaning is left open to us, the summertime should be tided over, if possible, before nursing is brought to a close.

When artificial feeding is necessary, the character of and the care of the food is of vital importance in securing prophylaxis. Everyone knows the enormous difference in the numbers of bacteria present as seen in the most carefully produced and guarded milk on the one hand, as compared with that, on the other, which has not received this care. Those who have watched the lessened frequency in the incidence of summer diarrhea connected with the purification of the milk supply cannot share the view of Finkelstein upon the little etiological importance of the bacteria in milk. Further, it may be stated that the application of heat to milk, although it does not destroy toxins, at least does destroy and, with proper later precautions, inhibit the growth of bacteria, and to this extent the procedure is a valuable prophylactic measure. The danger from scurvy with heated milk is so much less than is the danger of diarrhea from the use of raw milk, that it fades into insignificance, particularly since the development of the

disease is so readily preventable by the giving of orange juice. All but the best milk should be pasteurized, and even this should be subjected to the process in summer weather. But by pasteurization is not intended here *commercial* pasteurization, which we cannot supervise, and of the thoroughness of which we know nothing, and which often gives to the physician and the mother a false feeling of security.

Not only is the prevalence of bacteria in the food to be avoided or counteracted, but care should be given to the proper composition of the milk mixture. This is too large a subject to be discussed here in detail. Merely may it be stated that always, and especially in summertime, underfeeding is certainly a less grave error than is overfeeding. A moderate degree of imperfect development of weight and of growth in general is to be preferred to a severe and perhaps fatal diarrhea. What has been said is, however, not to be considered a brief for underfeeding; although at least in the spells of torrid weather which occur from time to time in the summer season, both the strength and the amount of the infant's food may well be reduced for a period. The effort should be to make the food digestible and sufficiently nourishing, and no more than this.

As to the elements of the food chiefly to be guarded against lest diarrhea develop, the precautions doubtless vary with the case. In general, protein is less liable to give trouble than is an excess of fat or sugar. Opinions are divided as to which of these two is oftener the cause. In my own experience, more difficulty is encountered in the digestion of the fat of cow's milk than of any other element; less often, although still not infrequently, an excess of sugar is not tolerated.

(2) *Diet During Diarrhea.* For the treatment of the attack itself, the correct management of the diet is by far the most important factor in treatment. The first and most vital step in this direction is the immediate and complete withdrawal of food at the beginning of the attack. It is a little difficult to teach mothers this; even those of the better class. The fear seems to exist that the baby will starve. That the initial starvation should be immediate is of importance, and mothers should be instructed that, with any digestive disturbance whatever, food is to be withdrawn at once, without waiting to get into communication with the physician.

Combined with the withdrawal of food should naturally be the removal of any already in the intestinal canal. This is to be accomplished by the prompt exhibition of a purgative, such as castor oil for young infants, and magnesia in some form for older ones or for children, since castor oil is very liable to be rejected by them. If vomiting attends the diarrhea at the beginning, it may be necessary to wait before a purgative can be safely administered. In any case, a large intestinal douche may be given with advantage.

How long the initial starvation shall continue depends upon the case. Breast fed infants may well have the breast withdrawn for 24 hours, and those bottle fed require usually a longer time. Water, of course, should be administered freely, and it will relieve the mother's mind if barley water is used instead of simple water. While fever continues, showing that an infection is still present, return to a milk food should be delayed, and the resumption of it finally be made very carefully, giving small amounts diluted, and preferably skimmed, the original strength of the mixture being only very gradually resumed. As already stated, an excess either of fat or of sugar may cause diarrhea; but which is the agent in any individual case and which element must be most cautiously returned to the diet, must, of course, be determined for the individual. Broths, thickened with an amylaceous substance, or even thicker unirritating porridges, are extremely serviceable when the time for food has come but while one still fears the action of milk. It seems odd that the milk upon which the child has previously been thriving, and which would seem to be nearest to its natural aliment, should become an active poison when summer diarrhea has once developed.

When cases have proven tedious and obstinate, it is often best to abandon efforts to return to the former milk mixture, and to make a complete change in the diet, using whey, casein milk, buttermilk, or the like. Sometimes the thick gruels, to which reference has been made, are of great value as a food; bearing in mind, however, the occasional danger of producing a starch-edema when no protein or an insufficient amount of it is given. In some cases nothing will be of service but the administration of human milk.

With regard to the administration of starchy food, so often of so much value in the treatment of diarrhea, it is well to remem-

ber that in not infrequent cases the greater part of it is passed from the bowel completely undigested. It shows under these circumstances some resemblance to mucus or even to milk; but that it is starch can, of course, be readily determined by the iodine test. In such cases, where starch is undigested, sugar increases the diarrhea, and fat is eliminated as curds, the only remaining element is protein, which can often be given in comparatively large amount and with relatively little of any other food element employed. Such a diet is not one suitable for long continuance, and fortunately the need for this does not very often arise.

The great danger of relapse and recurrence is not to be forgotten. It may exist through the whole of the summer, and it may be necessary to maintain a restricted diet until the hot weather is over. Particularly should the mother be made to understand that a gain of weight after an attack of summer diarrhea is a matter of entirely minor importance. After the summer is over and the digestive power fully re-acquired, the obtaining of the desired gain is usually a simple matter. Yet in this connection the converse must be emphasized. I have repeatedly seen infants, both younger and older, allowed to emaciate badly, merely because the physician was without the courage to increase the diet when it could and should have been thus increased.

What has been said applies particularly to the diet in acute intestinal indigestion and in the ordinary type of acute gastroenteric intoxication. Some slight modification of it must be made in other forms. In acute milk poisoning, it is even more important to institute a total abstinence from food, and the return to it should be made with the greatest caution. Meanwhile nothing whatever but water should be given, by the stomach if it can be retained, if not then in other ways. The water may be in the form of a normal saline solution, or, better, of a 1 per cent. solution of bicarbonate of soda, since acidosis is one of the great dangers in this condition. On the other hand, in the diarrhea occurring in severely marantic subjects, prolonged starvation is inadmissible, and here it may be necessary to feed in some way earlier than one otherwise would. Again when gastrointestinal intoxication has passed into an ileocolitis, as it often does, or when the attack has been of this nature from the beginning, we are probably in for a prolonged illness; and after the initial

starvation care must be taken to maintain the strength by a suitable dietary. All efforts in this direction must, of course, be made cautiously, and it may be necessary to maintain the withdrawal of milk for some weeks and to use other sufficiently nourishing food in place of it.

Another form of summer diarrhea is not infrequently seen; or at least one which is liable to owe its origin to an acute attack. I refer to the condition of chronic diarrhea frequently a sequel to an ileocolitis, or especially to the form of recurrent or more persistent looseness of the bowels existing as a symptom of chronic intestinal indigestion. This is a condition with symptoms so characteristic, so troublesome, and so prolonged, and with dietetic treatment requiring in all particulars so much detailed study of the individual case, that time does not permit of an extended discussion of it. Only trial can eventually determine what sort of food will be tolerated best, guided by a careful study of the past history of the case, and the relation which symptoms bore to changes in the food. This study cannot be too minute. There may be faults in the frequency of feeding or in the amount of or the composition of the food. The examination of the stools may show the passage of too much fat, or irritation of the buttocks may point to an excess of sugar. There is a large choice among the foods we may try. The high protein foods, such as casein milk or the ordinary buttermilk mixture, may serve well. Sometimes the latter will not agree until the amount of sugar is reduced; or one form of sugar may be better tolerated than another. The large amount of unconverted carbohydrate in the buttermilk mixture and the small amount of fat are factors which make it often suitable. Where fat is tolerated in a moderate, although reduced amount, malt soup may prove serviceable, the carbohydrate making up for the diminished quantity of fat and of protein. Casein milk may answer well where it is desired to keep the sugar low, the protein high, and the fat in fair amount. When milk in any form is not tolerated, we must depend largely upon albumin water or upon animal broths fortified with a cereal addition and with the finely divided meat fibre retained.

In the case of older children, the problem is increased by the number of articles of diet among which one has to determine the cause. In these cases, diarrhea may occur only during the exacerbations, or may alternate with constipation. The treatment,

however, is the same, since it must be directed to the cause. As regards the choice of food, only general suggestions can be considered here. The most frequent cause is an excess of carbohydrate in the diet; that is to say, an amount more than the child can digest, although it may not in itself be unduly large. Next in order stands an excess of fat. In bad cases it may be necessary for a time to eliminate largely both of these elements. Consequently a diet rich in protein is often the best. Naturally all this must be determined for the individual case, and there is little which presents a greater therapeutic problem to a physician in caring for a sick child.

PATHOGENESIS OF CHOREA (Pediatria, Naples, Sept., 1919). P. Foti relates that syphilis was unmistakable in 13 out of the 17 cases of chorea given treatment at the children's clinic at Naples during the last five years. It was probable also in 3 others, and only 1 of the 17 children seemed to be entirely free from the taint in every way. He insists that this 95 per cent must be more than the mere coincidence which Comby thinks it is. He regards it as a predominating influence in the pathogenesis of chorea as the principal predisposing factor, entailing such instability of the nervous system that the most diverse causes, infections, emotional stress or metabolic disturbance may bring on the chorea.—*Journal A. M. A.*

VACCINE THERAPY OF DYSENTERY IN CHILDREN (Pediatria, Naples, Sept., 1919). F. P. Borrello gives full details of 24 cases of dysentery in young infants and children up to 10 years old. The disease is more common in children than generally recognized, and seems to be graver the younger the child, and in the Shiga form, but the Flexner form is liable to prove fatal also, especially when secondary to other disease. Treatment is principally with the specific vaccine, and this is more effectual the earlier it is begun. Its efficacy is most striking in the Shiga form, which without it is almost invariably fatal.—*Journal A. M. A.*

THE BACTERIOLOGY OF SUMMER DIARRHEA.*

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Infantile diarrhea is generally due to infection with members of the typhoid, paratyphoid, and dysentery groups of bacteria, most frequently the latter. Occasionally other bacteria are the causative agents of this disease, namely the Gaertner group, the proteus group, or the Welchii group. It is sometimes difficult to differentiate between infection by these different groups of bacteria and diarrhea due to disturbances of digestion induced by unsuitable foods.

In the greater proportion of instances the summer diarrheas of children are caused by the invasion of the intestinal tract by members of the dysentery group of bacteria. The expression "dysentery group" is used because we recognize 4 or more types of organisms which can be differentiated from each other but which show close relationship when subjected to cultural and serologic tests and they are found, moreover, in allied pathologic conditions in the intestines of human beings.

The recognized types of the dysentery group of bacteria include the type first discovered by Shiga in Japan and later found to be disseminated over the whole world; the type discovered by Flexner in the Philippines, but since found in all countries; the type discovered by Hiss & Russell in Maine and the type discovered by Strong in the Philippines. Other types have been distinguished by different investigators but no practical advantage has been derived from further differentiations into types so it will not be necessary to give additional details.

The Shiga type of the dysentery bacillus is the most virulent of the entire group and causes the more serious epidemics, though there appears to be no other marked difference in pathogenesis except in greater virulence. All the different types of the dysentery organisms seem to produce similar pathologic lesions and clinical symptoms, so that the particular type of organism affecting a patient can not be foretold and is ascertained only by isolation of

*Read at a Symposium before The Philadelphia Pediatric Society, May 11, 1920.

the causative organism and study of its cultural and serologic characters.

The main difference in the dysentery organisms consists in the absence of motility in the Shiga type while all the others are generally regarded as being motile. The Shiga type ferments dextrose with acid formation while the others ferment some of the other carbohydrates, especially mannite. A further cultural difference is found in the ability to form indol. The Shiga type does not form indol while the others have this function. The presence of flagella and indol production brings 3 of the types of the dysentery organism into closer relationship with the colon bacillus. The Shiga type, on the other hand, is not so closely related to the colon bacillus as are the others, but stands nearer to the typhoid bacillus.

All the dysentery organisms show still another relationship to the colon bacillus in that they also have their habitat in the colon of man. They have a distinct predilection for this part of the intestinal canal. When the living organisms are injected intravenously into a rabbit the principal lesions are found in the colon. Even cultures killed by heat or otherwise, when injected intravenously, produce alterations in the colon.

The dysentery bacilli form exotoxins in addition to endotoxins. The exotoxins are characterized especially by the alterations they induce in certain nerve structures, whereby they give rise to paralysis. This paralysis is caused by neurotoxin which is elaborated by the dysentery organism. This property is especially pronounced in cultures of the Shiga type. The other types of the dysentery organism produce smaller amounts or a less active exotoxin than is formed by the Shiga type.

The pathologic changes in the colon in dysentery are caused by the endotoxins. Wherever the bacteria are localized in the intestine they produce edema, followed by necrosis and an exudation of serum and cells leading to the formation of the so-called diphtheritic membrane which covers the inner surface of the bowel. The necrosis of the intestinal wall accounts for the blood-stained mucus and the blood thrown off in the bowel discharges.

The dysentery organisms are found only in the intestinal contents of the patient, in the intestinal mucosa, and less frequently in the mesenteric lymph nodes. The organisms do not ordinarily

invade the blood stream, hence our efforts to find and isolate the bacteria must be applied to the intestinal discharges.

The bacteriologic diagnosis of dysentery is usually accomplished without difficulty, during the acute stage of the disease. Particles of mucus in the feces, washed in sterile salt solution, are planted on agar plates or on some of the special plate media that have been constructed for the isolation of the pathogenic bacteria of the intestines, such as Endo, Conradi, or MacConkey agar medium. Suspicious colonies are transplanted into liquified mannite agar. In this medium the ordinary intestinal organisms produce gas while the mannite fermenting types of the dysentery group produce only acid. The Shiga dysentery organism leaves the mannite unchanged. From the same colonies plain agar cultures should also be prepared for the study of the morphology and to determine their agglutinability with dysentery serum. For this purpose both monovalent and polyvalent sera should be at hand so that the type of dysentery organism may be determined for each patient.

The dysentery organisms are found in the intestinal discharges from the very beginning of the symptoms and continue to be given off in the feces in considerable numbers until convalescence is established. At times the organisms persist in the intestinal canal even after all symptoms have abated and the patient has returned to apparently normal health. In such instances the patient has become a carrier of the dysentery organism. Carriers of dysentery organisms are also encountered in which there is no history of a previous infection.

The reason for the development of the carrier state is not clear. It appears, however, to be due to lack of marked immunization during the course of the disease. Since the dysentery organisms do not invade the blood stream it seems that in this disease there is less opportunity for immunization to be brought about than in some other infections.

In dysentery, as in all other infections, it is the carrier, adult or infant, that is the greatest menace to the public health. Because of this fact, no dysentery patient should be released from observation until bacteriologic examinations have shown the absence of the organism from the intestinal content on 3 successive examinations at intervals of 5 days. These examinations should be made only after all symptoms have abated and the patient is convalescent.

The diagnosis of dysentery infection by the agglutination reaction is not as reliable as in typhoid fever because the agglutinins do not always appear in the blood as early nor in as high proportions. This method of diagnosis has, therefore, a confirmatory value of less importance in dysentery especially in the earlier stages of the disease. When agglutinins have developed they may serve to aid in determining the type of dysentery organism affecting the patient.

In carriers of the dysentery organism without a history of an attack of the disease, the agglutination reaction is usually absent so that this test is of little or no value in detecting this type of carrier. Cultural studies can alone determine the carrier state.

The definite establishment of the fact that, at least, the Shiga type of the dysentery organism produces an active exotoxin, suggests the advisability of preparing immune serum that combines the antitoxic and antibacterial properties. Such a serum, if used early in the disease, should prove more efficacious than an antibacterial serum. Moreover, immunity tests on animals indicate that monovalent serums are of greater efficiency than are polyvalent serums prepared by immunizing animals against all the different types of the dysentery group. If the type of dysentery organism is known, then a monovalent serum for that particular type of organism would prove more helpful than a polyvalent serum. If the type of dysentery organism is not known, then a polyvalent serum should be used until such time when the particular type is determined and then the corresponding monovalent serum can be employed.

It is possible to use vaccine to actively immunize persons against the dysentery organisms. This procedure is of special importance in combating an epidemic of the disease in an institution where many children are closely associated. In this manner, epidemics may be checked when other measures have proven unsuccessful. The use of vaccine for the prevention of dysentery has not been generally adopted because this disease, in recent years, has not appeared in such widespread outbreaks as was the case some years ago, hence there has been less need for wholesale immunization, even in the Army. It is well to remember that it is possible to immunize against the disease by injecting the dead organisms. Where such vaccines have been used, it has been

found that the reactions produced are more severe than in immunization against typhoid and paratyphoid fevers.

Since summer diarrhea in children is not a specific disease, it is necessary to bear in mind that the dysentery organisms are not the only causative agents of this disease. A certain proportion of these infections are caused by the typhoid, paratyphoid and Gaertner groups of bacteria. The bowel discharges in typical dysentery infections are usually characteristic, but atypical cases are also common and in these the bacteriologic examination must reveal the nature of the infection.

In the typhoid infections, a variety of media has been suggested to aid in the isolation and identification of the causative organisms. Preliminary cultivation of the fecal organisms in bile, lactose bile, or malachite green broth and subsequent plating on Endo agar have proven helpful for the isolation of the bacteria. From the Endo plates suspicious colonies are transferred to Russell's double sugar agar and to plain agar, and the suspicious cultures are tested as to their agglutinability with specific immune serum.

Patients suffering from the typhoid infections should be kept under observation until they have been found free of the infecting organisms by bacteriologic tests on 3 examinations at 5 day intervals.

The other groups of bacteria which may be the causative agents of summer diarrhea are all traceable to either contaminated foods or to direct transmission by flies. These forms of diarrhea are less likely to terminate fatally than those caused by the dysentery and typhoid groups of bacteria, and, as a rule, they are checked by the substitution of uncontaminated foods and by careful protection against flies.

Diarrheal conditions caused by improper foods are also of short duration and easily checked by the substitution of proper foods.

The summer diarrheas are diseases that are not peculiar to infants, but, on the other hand, they are disseminated amongst the infant population through a variety of agents. Contaminated foods, especially milk, is a most important factor in the spread of these diseases. Flies also play a large part in the spread of these diseases. The carrier, who is not actually suffering from the disease but who carries, in one way or another, the infecting organisms to the healthy and unprotected infant is perhaps, today, the

most important agent in the dissemination of the diarrheal diseases.

The infections by the dysentery and typhoid groups of bacteria call for the most rigid care of the intestinal discharges. These discharges are all potentially, if not actually, contaminated with the causative organisms and may contain millions of the organisms. The discharges, the clothing and the bodies of the infants must be disinfected to prevent the further spread of the disease. This is a task that requires the intelligent oversight of one who has had the necessary training in the management of these diseases.

Our efforts to control the infantile diarrheas should be directed toward the regulation of the environment of the infant population. This can be accomplished only through the education of those who are concerned with the care and management of infants. The mother, the nurse, as well as the other attendants, must be brought to realize the possibility of the transmission of the diarrheal diseases through different channels.

The control of infantile diarrhea becomes largely a problem of personal hygiene for those who are responsible for the care of the infant. If they themselves are free from the infecting organisms and exercise due care with regard to the feeding, cleanliness and clothing of the infants, and to the exclusion of flies, much will be accomplished in the control of these diseases.

INHERITED SYPHILIS AND RACHITIS (Pediatria, Naples, Sept., 1919). Cannata relates that he has been studying during the last five years the possible connection between inherited syphilis and rachitis. There were 1,285 rachitic infants among the 10,000 that passed through the children's clinic in that period, and 37.27 per cent of the rachitic children had inherited syphilis. Excluding those with tuberculosis or chronic skin disease, there were 58 breast fed infants in whom the rachitis seemed to be connected with the inherited syphilis, and the latter dominated the clinical picture. The set of symptoms described by Marfan (craniotabes, pronounced anemia, and splenomegaly) as characteristic of rachitis with inherited syphilis, was found equally pronounced in 18 infants under 6 months old who seemed to be free from all inherited taints.—*Journal A. M. A.*

WEIGHT AND HEIGHT IN RELATION TO MALNUTRITION

BY WILLIAM R. P. EMERSON, M.D., AND FRANK A. MANNY.*

Malnutrition is a clinical entity with characteristic history, definite symptoms and pathological physical signs. The malnourished child is a sick child, and should be so classed. With this clinical picture in mind we have a check on the various weight tables in common use. The mere fact that a child is underweight according to a certain table does not necessarily mean that he is malnourished or even undernourished. The relationship between the individual child's weight and any table of average weights is evidence, but not conclusive evidence, of his physical condition. If the tables are based on proper data they should be not only a means of diagnosing malnutrition, but an aid in measuring its degree.

Proposed tests. In dealing, then, with any condition requiring correction in the individual child it is important to know, not only the actual facts of present status, but also the standard which ought to be met. In matters of growth various tests for its measurement have been proposed. Many of these are suggestive, and the field is well deserving of further investigation. The subject has been presented in another article¹ in which it is shown that none of these studies have as yet given much direct help except those concerned with development in terms of weight and height.

Weight and age. The basis most frequently used in discussion hitherto has been weight in relation to age. But in the clinic we were early impressed with the practical difficulties of a program which called for great effort on the part of the child to come up to the average weight for his age. The standard set was in many instances so far beyond his present achievement as to appear unattainable. He therefore became discouraged and made no progress at all. To attempt the impossible is not a reasonable means of reaching any goal but failure.

Height and age. The basis of height for age is even more confusing because many of the children most in need of care are above the average scale of height for their years.

Weight and height. One general physiological principle, how-

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¹P. A. Manny, *Indexes of Nutrition and Growth*. (See References.)

ever, seems to be applicable to all cases; that is, however tall or short a child may be, he requires sufficient body weight to sustain that height. In the many thousands of cases that have come under our observation we have never found an instance in which this basis has proved to be impracticable.

The malnourished. With this as a starting point the next step was to find what range of variation in the relation between weight and height was compatible with conditions of reasonably good health and growth. Ten per cent. underweight was taken as a working hypothesis, but it was soon evident that many children needing care did not come within this rule. After considering all the clinical evidence, we have found that an habitual 7 per cent. underweight for height is the most satisfactory dividing line.

This marks off the lower boundary of the safety zone. It does not indicate an ideal weight for height because children are found to be better off if they run 10 per cent. higher than this minimum.

The obese. A consideration of the upper boundary was afforded by the cases of children so much overweight that they showed impairment in activity and disposition, as well as a general lowering of their health, convenience and comfort. A study of our cases indicates that 20 per cent. overweight serves to distinguish the children who may be called obese.

The normal zone—stunted variants. This zone lying between 7 per cent. underweight and 20 per cent. overweight, separates the fairly normal group from those who should be under treatment at one extreme for malnutrition, and at the other for obesity. There are, however, a considerable number of children still left in the central zone who are definitely stunted; that is, not only underweight but also underheight. With proper health conditions these children soon prove that they have capacity for growth in both weight and height not heretofore realized. In this group are included those who are constitutionally affected by such conditions as syphilis, deficient thyroid, the effect of drugs such as caffeine and nicotine, and those recovering from such long continued illnesses as tuberculosis.

Individual diagnosis. We make it a rule to use the weight-height ratio for the purpose of selecting that large group of malnourished children most urgently in need of attention, and then

depend upon individual diagnosis to identify other cases not reached by the general rule. Any child who is clearly below the height and weight measurements usual at his age receives special consideration even though his ratio may be normal. In such a case an actual condition of good health and proper growth factors must be proved before it is fair to assume that the child is developing as well as it is possible for him to do.

Extent of malnutrition. The tests which we have applied to large numbers of children indicate that from 20 to 40 per cent. of the children of school and pre-school age in this country are habitually underweight for their height, and present both physical and mental signs of malnutrition. The results accomplished in nutrition classes show that under proper treatment and care practically all of these children can be made well in their own homes. The expression "made well" is used advisedly, for children who are habitually underweight for their height, are really sick, and present, practically without exception, in their history and on physical examination other distinctive signs of impaired nutrition which indicate that they are not only undernourished but malnourished.

The clinical picture. In the history we find the malnutrition coming on after a certain illness, or as a result of overfatigue, or of faulty food or health habits. At the same time the child becomes irritable, tires easily, lacks physical and mental control, and exhibits other indications of nervous disturbance.

Among the physical signs, besides the weight to height ratio, are lines under the eyes, anxious expression, pallor, mouth-breathing and other signs of nasopharyngeal obstruction; the anterior cervical glands are apt to be enlarged; the muscles flabby (tested by feeling the upper arm); there may be ptosis, fatigue posture, round shoulders, lateral curvature, flat chest, rigid spine, prominent abdomen and pronated or flat feet. By fatigue posture we refer to an appearance similar to the senile stoop due to weak muscles.

As the child approaches the normal there is clinical evidence of a transformation that is both physical and mental. There is a return of color and a glow of health that is unmistakable. Practically every parent states that the patient has "become a different child." Normal reactions appear, restlessness and irritability diminish, and the child ceases to be "finicky" and

"nervous." These are the same changes we look for after a long rest or a vacation.

Evidence of stunted growth. When conditions have been corrected for a malnourished child, nature apparently gives a strong initial impetus to his development. This is evidenced by the first rapid advance in growth, the rate of which is gradually reduced as he approaches normal condition. After the increase in weight has well started there is an increase in height also. This is more rapid than the rate of growth in the normal child—a sudden making up of the retarded growth following the removal of the causes which first made the child stunted. This is illustrated in Chart I.

When a child is becoming malnourished, the loss of weight is very evident, but frequently the gain in height continues. The place of these two factors in practical work is suggested by Robertson in the following statement: "The variability of stature is much less than the variability of weight, from which we may infer that as a criterion of abnormality the measure of stature is more reliable than that of weight, while as a sensitive indicator of the effects of environmental, physiological or dietetic fluctuations, provided statistical methods of investigation are employed, the measure of weight is to be preferred to stature."

Vitiated tables. All tables of weight and height now in use are vitiated by the fact that they contain the measurements, not only of those who have accomplished normal growth, but also this 20 to 40 per cent. group who are habitually underweight for their height, as well as an undetermined number less underweight, but presenting other definite signs of malnutrition. It may be argued that the subnormal children are balanced in the tables by those who are overweight, but experience shows that the comparatively small number of cases sufficiently overweight to be considered abnormal are more than overbalanced by the borderline cases, without taking into account any of those who are clearly underweight for their height.

We need a record which has ruled out as far as possible, by physical examination, the groups described above. The remainder would furnish us data for physiological norms showing the range of normal children within a zone of healthy growth.

The foregoing paragraphs present the clinical evidence lying back of the tables which are here published.

Chart I

Age 9 yrs. 7 mos.

Underweight 9.4" lb. Per Cent 17

Height 49 in.

Average Height for Age 51 in.

Weight 46 lbs

Average Weight for Height 55.4 lbs.

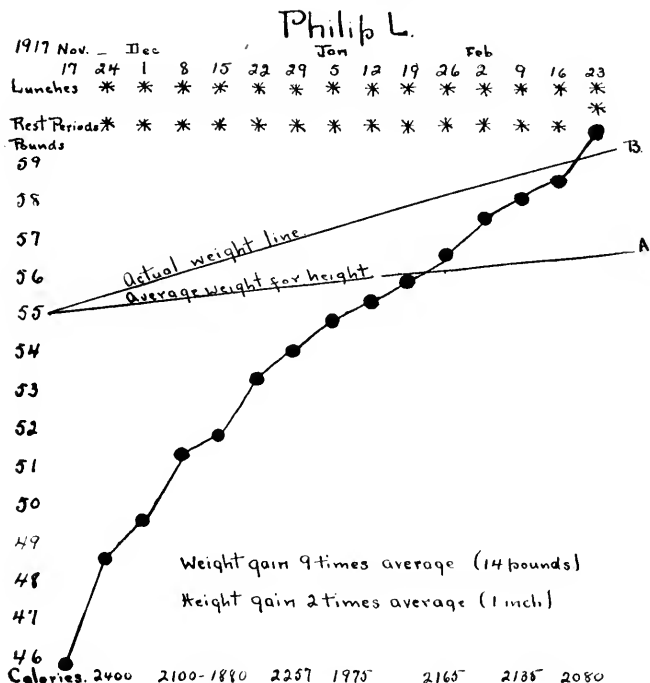


CHART I shows the record of a boy of 9 years and 7 months, who was 17 per cent. underweight for his height. During 14 weeks he gained 14 pounds in weight and 1 inch in height. Line A indicates his expected gain line as worked out when he first came to us. The fact, however, that during the time in which he was gaining rapidly in weight he also made twice as much gain in height as would be expected at his age is good evidence that he was below normal in height, which has to do with skeletal growth, as well as in weight for height. This would indicate that he was stunted and had capacity for growth beyond what he had attained. Further evidence of this statement appears clinically, for the boy was not up to normal when he had gained the 9.4 pounds which he lacked at the start. His gain in height required a new expected weight line (see line B on the chart) and it was only on reaching this new ratio that he became clinically well.

The constant occurrence of this change seems strong evidence that all children habitually 7 per cent. underweight for their height are retarded about a year in growth. The 7 per cent. by itself does not amount to this but the additional weight necessitated by the extra gain in height makes up the difference.

Sources of our tables. For the early years we have used for some time Holt's revised figures which he kindly furnished us before publication. These are now available in the latest edition of "The Diseases of Infancy and Childhood." The figures for children of school age we have taken for the most part from the basal studies of Boas and Burk which incorporate the work of Bowditch, Peckham, Porter and others, aggregating in all some 90,000 measurements. The results of their studies have appeared in two forms. One of these takes the mean of all measurements for each year of age at the half year¹, while the other, counts all those of a given year as if they were made at the beginning of the year². This places the weights and heights of the latter version 6 months in advance of those of the former.

Tables set forward. The general correctness of the first form of the table is evident in any study which includes all the children examined, without excluding the 20 to 40 per cent. who are clearly below par. This is illustrated in Charts II and III. The wide use made of the latter form of the table, in which the figures are set forward half a year, has been due, no doubt, to the fact that it represents better than the other the measurements of fairly normal children.

On this account we have deliberately set the figures forward half a year in our tables because clinical work conducted both in the hospital and with so-called well children in school has shown that the curves on that basis represent better working standards than do any others now available. It will be observed that this form of the Boas-Burk figures articulates well with those of Holt's table for younger children, while the other form leaves a break in the line.

Such studies as those of Baldwin and Robertson, made on smaller groups of selected children, indicate results which run much higher than even our "set forward" figures. (See Charts IV and V). We have tested our tables by the various records referred to in Baldwin's bibliography and also by later investigations such as those made by the Metropolitan Life Insurance Company in their study of candidates for working papers, and that of Greenwood which includes 350,000 measurements of English school children.

¹B. T. Baldwin, *Physical Growth and School Progress*, p. 150.

²J. L. Morse, *Case Histories in Pediatrics*, p. 13.

NUTRITION CLINICS FOR DELICATE CHILDREN
TABLE OF AVERAGE WEIGHTS OF CHILDREN AT VARIOUS HEIGHTS
 Also Showing Weights 7% and 10% Underweight for Height

BOYS				GIRLS			
<i>Height Inches</i>	<i>Average Weight for Height Pounds</i>	<i>7% Under- weight Pounds</i>	<i>10% Under- weight Pounds</i>	<i>Average Weight for Height Pounds</i>	<i>7% Under- weight Pounds</i>	<i>10% Under- weight Pounds</i>	<i>Height Inches</i>
21	8.2	7.6	7.4	7.9	7.3	7.1	21
22	9.7	9.0	8.7	9.4	8.7	8.5	22
23	11.1	10.3	10.0	11.0	10.2	9.9	23
24	12.5	11.6	11.3	12.5	11.6	11.3	24
25	13.9	12.9	12.5	14.0	13.0	12.6	25
26	15.3	14.2	13.8	15.5	14.4	14.0	26
27	16.9	15.7	15.2	17.2	16.0	15.5	27
28	18.5	16.2	16.7	18.8	17.5	16.9	28
29	20.2	18.8	18.2	20.5	19.1	18.5	29
30	21.7	20.2	19.6	22.0	20.5	19.8	30
31	23.2	21.6	20.9	23.4	21.8	21.1	31
32	24.5	22.8	22.1	24.8	23.1	22.3	32
33	25.9	24.1	23.3	26.0	24.2	23.4	33
34	27.3	25.4	24.6	27.3	25.4	24.6	34
35	28.7	26.7	25.8	28.6	26.6	25.7	35
36	30.0	27.9	27.0	30.0	27.9	27.0	36
37	31.6	29.4	28.4	31.5	29.3	28.4	37
38	33.2	30.9	29.9	32.7	30.4	29.4	38
39	36.3	33.8	32.7	35.7	33.2	32.1	39
40	38.1	35.4	34.3	37.4	34.8	33.7	40
41	39.8	37.0	35.8	39.2	36.5	35.3	41
42	41.7	38.8	37.5	41.2	38.3	37.1	42
43	43.5	40.5	39.2	43.1	40.1	38.8	43
44	45.4	42.2	40.9	44.8	41.7	40.3	44
45	47.1	43.8	42.4	46.3	43.1	41.7	45
46	49.5	46.0	44.6	48.5	45.1	43.7	46
47	51.4	47.8	46.3	50.9	47.3	45.8	47
48	53.0	49.3	47.7	53.3	49.6	48.0	48
49	55.4	51.5	49.9	55.8	51.9	50.2	49
50	59.6	55.4	53.6	58.3	54.2	52.5	50
51	62.5	58.1	56.3	61.1	56.8	55.0	51
52	65.8	61.1	59.2	63.8	59.3	57.4	52
53	68.9	64.1	62.0	66.8	62.1	60.1	53
54	72.0	67.0	64.8	70.3	65.4	63.3	54
55	75.4	70.1	67.9	74.5	69.3	67.1	55
56	79.2	73.7	71.3	78.4	72.9	70.6	56
57	82.8	77.0	74.5	82.5	76.7	74.3	57
58	87.0	80.9	78.3	86.6	80.5	77.9	58
59	91.1	84.7	82.0	91.1	84.7	82.0	59
60	95.2	88.5	85.7	96.7	89.9	87.0	60
61	99.3	92.3	89.4	102.5	95.3	92.2	61
62	103.8	96.5	93.4	110.4	102.7	99.4	62
63	108.0	100.4	97.2	118.0	109.7	106.2	63
64	114.7	106.7	103.2	123.0	114.4	110.7	64
65	121.8	113.3	109.6	130.0	120.9	117.0	65
66	127.8	118.9	115.0	137.0	127.4	123.3	66
67	132.6	123.3	119.3	143.0	133.0	128.7	67
68	138.9	129.2	125.0	146.9	136.6	132.2	68

*Without Clothing.

TABLE OF AVERAGE WEIGHT AND HEIGHT MEASUREMENTS
AT VARIOUS AGES

BOYS					GIRLS				
Years	Age	Height in Inches	Weight in Pounds		Years	Age	Height in Inches	Weight in Pounds	
Birth	Months				Birth	Months			
1	0	*20.6	*7.55	59.6	1	0	*20.5	*7.16	57.4
1	2	*22.5	*10.4	60.6	1	2	*22.3	*9.9	58.3
1	4	*24.5	*13.2	61.5	1	4	*24.2	*12.7	59.4
1	6	*26.5	*16.0	62.5	1	6	*26.0	*15.5	60.2
1	8	*27.5	*17.7	63.5	1	8	*27.0	*17.2	61.1
1	10	*28.5	*19.3	64.4	1	10	*28.0	*18.8	62.0
1	12	*29.5	*21.0	65.4	1	12	*29.0	*20.5	62.9
1	14	*30.3	*22.1	66.3	1	14	*29.8	*21.7	63.0
1	16	*31.1	*23.3	67.2	1	16	*30.6	*22.8	64.0
1	18	*32.0	*24.5	68.0	1	18	*31.4	*24.0	65.1
1	20	*32.7	*25.5	68.9	1	20	*32.0	*25.6	66.2
1	22	*33.4	*26.4	69.8	1	22	*32.7	*26.5	67.3
1	24	*34.0	*27.3	70.7	1	24	*33.4	*27.3	68.4
1	26	*34.7	*28.2	71.7	1	26	*34.0	*28.1	69.5
1	28	*35.4	*29.1	72.7	1	28	*34.6	*28.8	70.6
1	30	*36.0	*30.0	73.8	1	30	*35.3	*29.0	71.7
1	32	*36.5	*30.8	74.8	1	32	*35.9	*29.8	72.8
1	34	*37.0	*31.6	75.9	1	34	*36.5	*30.6	73.9
1	36	*37.5	*32.5	76.9	1	36	*37.0	*31.5	75.0
1	38	*38.0	*33.2	77.9	1	38	*37.5	*32.0	76.1
1	40	*38.5	*34.0	78.9	1	40	*38.0	*32.7	77.2
1	42	*39.0	*34.7	79.8	1	42	*38.5	*33.3	78.3
1	44	*39.5	*35.4	80.8	1	44	*39.0	*34.0	79.4
1	46	*40.0	*36.1	81.5	1	46	*39.5	*34.6	80.5
1	48	*40.5	*36.8	82.5	1	48	*40.0	*35.3	81.6
1	50			83.5	1	50			82.7
1	52			84.8	1	52			83.8
1	54			86.5	1	54			84.9
1	56			88.3	1	56			86.0
1	58			90.0	1	58			87.1
1	60			91.8	1	60			88.2
1	62			93.5	1	62			89.3
1	64			95.2	1	64			90.4
1	66			97.0	1	66			91.5
1	68			98.8	1	68			92.6
1	70			100.6	1	70			93.7
1	72			102.4	1	72			94.8
1	74			104.2	1	74			95.9
1	76			106.0	1	76			97.0
1	78			107.8	1	78			98.1
1	80			109.6	1	80			99.2
1	82			111.4	1	82			100.3
1	84			113.2	1	84			101.4
1	86			115.0	1	86			102.5
1	88			116.8	1	88			103.6
1	90			118.6	1	90			104.7
1	92			120.4	1	92			105.8
1	94			122.2	1	94			106.9
1	96			124.0	1	96			108.0
1	98			125.8	1	98			109.1
1	100			127.6	1	100			110.2
1	102			129.4	1	102			111.3
1	104			131.2	1	104			112.4
1	106			133.0	1	106			113.5
1	108			134.8	1	108			114.6
1	110			136.6	1	110			115.7

*Without Clothing.

TABLE OF AVERAGE WEIGHT AND HEIGHT MEASUREMENTS
AT VARIOUS AGES

BOYS					GIRLS				
Years	Age	Height in Inches	Weight in Pounds		Years	Age	Height in Inches	Weight in Pounds	
Birth	Months				Birth	Months			
1	0	*20.6	*7.55	59.6	1	0	*20.5	*7.16	57.4
1	2	*22.5	*10.4	60.6	1	2	*22.3	*9.9	58.3
1	4	*24.5	*13.2	61.5	1	4	*24.2	*12.7	59.4
1	6	*26.5	*16.0	62.5	1	6	*26.0	*15.5	60.2
1	8	*27.5	*17.7	63.5	1	8	*27.0	*17.2	61.1
1	10	*28.5	*19.3	64.4	1	10	*28.0	*18.8	62.0
1	12	*29.5	*21.0	65.4	1	12	*29.0	*20.5	62.9
1	14	*30.3	*22.1	66.3	1	14	*29.8	*21.7	63.0
1	16	*31.1	*23.3	67.2	1	16	*30.6	*22.8	64.0
1	18	*32.0	*24.5	68.0	1	18	*31.4	*24.0	65.1
1	20	*32.7	*25.5	68.9	1	20	*32.0	*25.6	66.2
1	22	*33.4	*26.4	69.8	1	22	*32.7	*26.5	67.3
1	24	*34.0	*27.3	70.7	1	24	*33.4	*27.3	68.4
1	26	*34.7	*28.2	71.7	1	26	*34.0	*28.1	69.5
1	28	*35.4	*29.1	72.7	1	28	*34.6	*28.8	70.6
1	30	*36.0	*30.0	73.8	1	30	*35.3	*29.0	71.7
1	32	*36.5	*30.8	74.8	1	32	*35.9	*29.8	72.8
1	34	*37.0	*31.6	75.9	1	34	*36.5	*30.6	73.9
1	36	*37.5	*32.5	76.9	1	36	*37.0	*31.5	75.0
1	38	*38.0	*33.2	77.9	1	38	*37.5	*32.0	76.1
1	40	*38.5	*34.0	78.9	1	40	*38.0	*32.7	77.2
1	42	*39.0	*34.7	79.8	1	42	*38.5	*33.3	78.3
1	44	*39.5	*35.4	80.8	1	44	*39.0	*34.0	79.4
1	46	*40.0	*36.1	81.5	1	46	*39.5	*34.6	80.5
1	48	*40.5	*36.8	82.5	1	48	*40.0	*35.3	81.6
1	50			83.5	1	50			82.7
1	52			84.8	1	52			83.8
1	54			86.5	1	54			84.9
1	56			88.3	1	56			86.0
1	58			90.0	1	58			87.1
1	60			91.8	1	60			88.2
1	62			93.5	1	62			89.3
1	64			95.2	1	64			90.4
1	66			97.0	1	66			91.5
1	68			98.8	1	68			92.6
1	70			100.6	1	70			93.7
1	72			102.4	1	72			94.8
1	74			104.2	1	74			95.9
1	76			106.0	1	76			97.0
1	78			107.8	1	78			98.1
1	80			109.6	1	80			99.2
1	82			111.4	1	82			100.3
1	84			113.2	1	84			101.4
1	86			115.0	1	86			102.5
1	88			116.8	1	88			103.6
1	90			118.6	1	90			104.7
1	92			120.4	1	92			105.8
1	94			122.2	1	94			106.9
1	96			124.0	1	96			108.0
1	98			125.8	1	98			109.1
1	100			127.6	1	100			110.2
1	102			129.4	1	102			111.3
1	104			131.2	1	104			112.4
1	106			133.0	1	106			113.5
1	108			134.8	1	108			114.6
1	110			136.6	1	110			115.7

*Without clothing.

TABLE SHOWING INCREASES IN WEIGHT AT VARIOUS AGES BY YEARS
QUARTERS, AND WEEKS

BOYS						
Age	Year—52 Weeks		Quarter—13 Weeks		Week	
	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces
Birth to 1 year	13.45	215.2	3.3625	53.8	.259	4.14
1 to 2 years	6.3	100.8	1.575	25.2	.121	1.94
2 to 3 years	5.2	83.2	1.3	20.8	.100	1.60
3 to 4 years	4.3	68.8	1.075	17.2	.083	1.32
4 to 5 years	4.0	64.0	1.0	16.0	.077	1.23
5 to 6 years	4.0	64.0	1.0	16.0	.077	1.23
6 to 7 years	4.3	68.8	1.075	17.2	.083	1.32
7 to 8 years	5.0	80.0	1.25	20.0	.096	1.54
8 to 9 years	5.1	81.6	1.275	20.4	.098	1.57
9 to 10 years	5.8	92.8	1.45	23.2	.112	1.79
10 to 11 years	5.3	84.8	1.325	21.2	.102	1.63
11 to 12 years	6.2	99.2	1.55	24.8	.119	1.91
12 to 13 years	7.9	126.4	1.975	31.6	.152	2.43
13 to 14 years	10.4	166.4	2.6	41.6	.200	3.20
14 to 15 years	12.2	195.2	3.05	48.8	.235	3.75
15 to 16 years	13.6	217.6	3.40	54.4	.262	4.18

GIRLS						
Age	Year—52 Weeks		Quarter—13 Weeks		Week	
	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces
Birth to 1 year	13.34	213.44	3.335	53.36	.257	4.11
1 to 2 years	6.0	96.0	1.50	24.0	.115	1.85
2 to 3 years	5.0	80.0	1.25	20.0	.096	1.54
3 to 4 years	3.8	60.8	.95	15.2	.073	1.17
4 to 5 years	3.6	57.6	.9	14.4	.069	1.11
5 to 6 years	3.6	57.6	.9	14.4	.069	1.11
6 to 7 years	4.3	68.8	1.075	17.2	.083	1.32
7 to 8 years	4.8	76.8	1.2	19.2	.092	1.47
8 to 9 years	4.9	78.4	1.225	19.6	.094	1.51
9 to 10 years	5.5	88.0	1.375	22.0	.106	1.69
10 to 11 years	6.6	105.6	1.65	26.4	.127	2.03
11 to 12 years	9.2	147.2	2.3	36.8	.177	2.83
12 to 13 years	10.0	160.0	2.5	40.0	.192	3.08
13 to 14 years	9.6	153.6	2.4	38.4	.185	2.95
14 to 15 years	8.4	134.4	2.1	33.6	.175	2.59
15 to 16 years	5.6	89.6	1.4	22.4	.108	1.72

The tables on pages 1 and 4 are based upon those on pages 2 and 3. The material of the latter for the first four years is taken from Holt's Diseases of Infancy and Childhood (1919)—that for the succeeding years is derived principally from the work of Boas, Burk, Bowditch and Smedley. The weights and heights in Holt's table are without clothing, while those of the later years are with indoor clothing but without shoes.

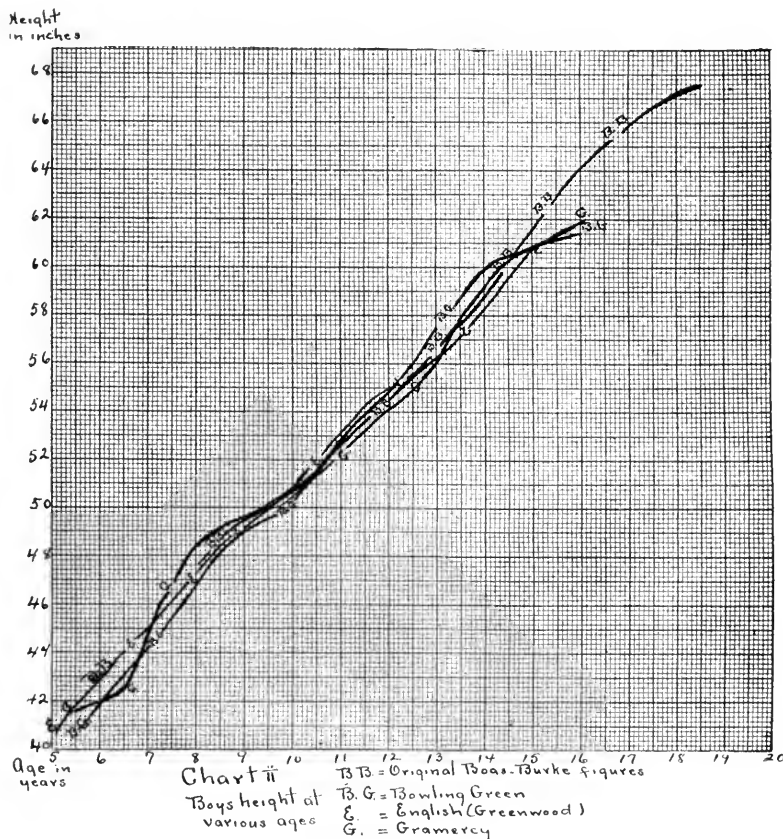
It will be noted that the figures for the later years differ from the Boas-Burk tables by six months. Our reason for setting the figures forward half a year is that in their original form they represent *averages* which include the very large number of children whom our clinical experience and studies of entire school groups find to be seriously malnourished. The tables in their present form run lower than those made in studies concerned mainly with normal children. As they are here printed they afford the best *working standard* for use until such a time as sufficient data are secured from weighing and measuring a large number of children who are normal.

NUTRITION CLINICS FOR DELICATE CHILDREN

44 DWIGHT STREET

BOSTON, MASSACHUSETTS

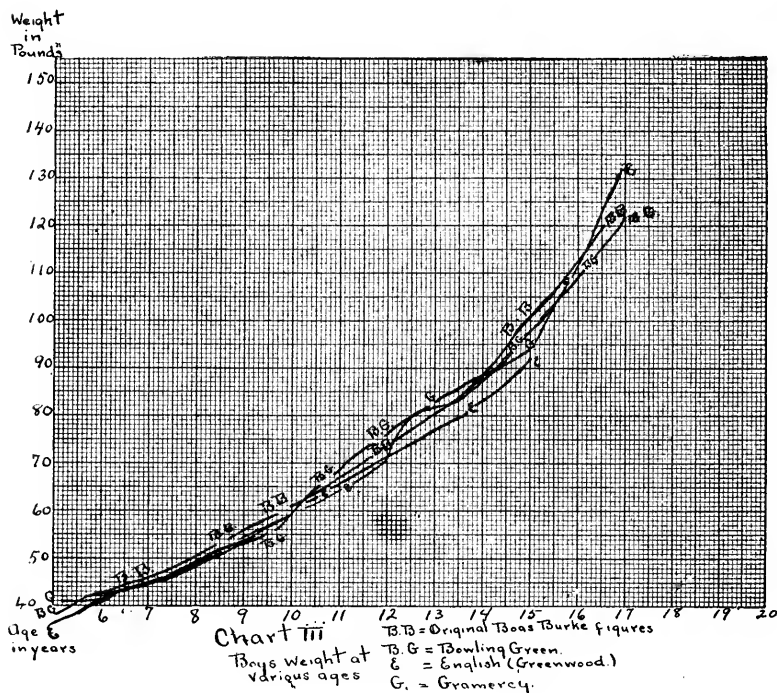
The zone standard. Wood has done valuable service in emphasizing the use of the zone system as opposed to any single line as a standard of reference. In the latest revision of his figures his results agree very nearly with the standard which we have adopted, although, as will be seen in Chart VI, he does not allow as wide a range of variation.



When we turn to age variations (see Chart VII) his range is less consistent, and we know of no clinical data which justify such modifications. For instance, according to Wood's latest table a girl of 7, with a height of 47 inches, should weigh 50 pounds, while a girl of 9, of the same height, should weigh 53 pounds. In his tables published in 1910 this was reversed, and the expected weight for the girl of 7 at the height given was

50 pounds, while the girl of 8 and 9, having the same height, had an expected weight of only 49 pounds. As Cannon states, "There is no physiological law which shows that a child should grow in height out of proportion to his weight. Furthermore, the average child has an average relation of height and weight."

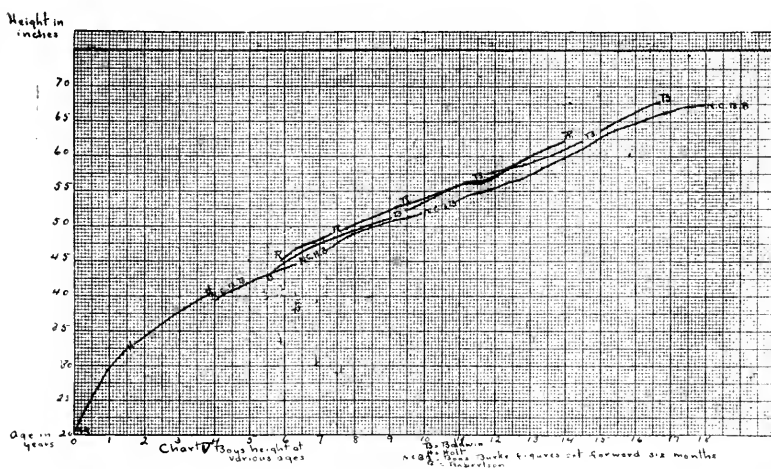
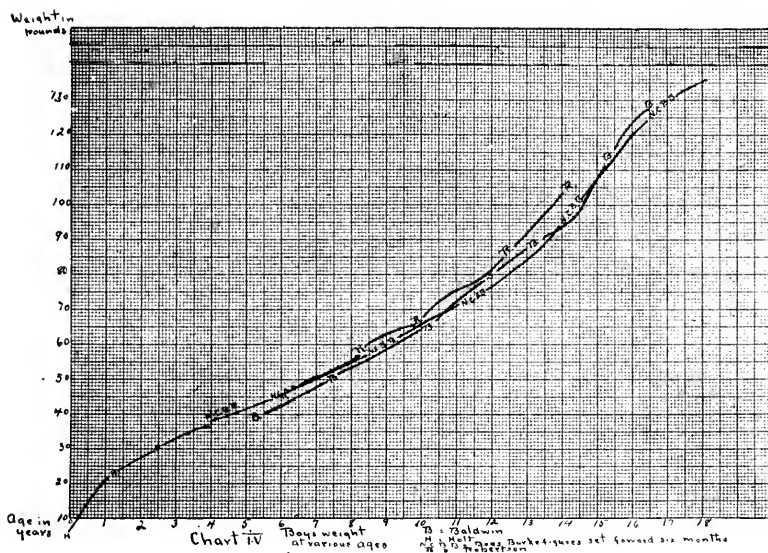
Within normal variations, therefore, we repeat that a given



CHARTS II and III show how closely the measurements of height and weight of the pupils in four New York City schools, taken in 1917, agree with the averages in the original Boas-Burke tables. The pupils were in two groups—the Gramercy and Bowling Green districts—and numbered in all about 2500, of whom one-fourth to one-third were malnourished. Similar results are shown by including measurements of 350,000 English school children compiled by Greenwood in 1914.

height requires a certain body weight to sustain it at any age. The increase in weight which a child may be expected to make is, of course, modified by his age no matter what his nutritional condition because of the factor of adolescence. The relation between retardation of adolescence and malnutrition is a subject needing further investigation.

Retan has recently worked out a chart showing the zones of



CHARTS IV and V afford a comparison of the tables used in our nutrition clinics with the results obtained by Baldwin and Robertson from selected children measured without clothing. The former used some 30,000 measurements and the latter 900. Note that even with the advance of half a year the line on which we base our standard runs *with clothing* below the lines of the more normal children measured *without clothing*.

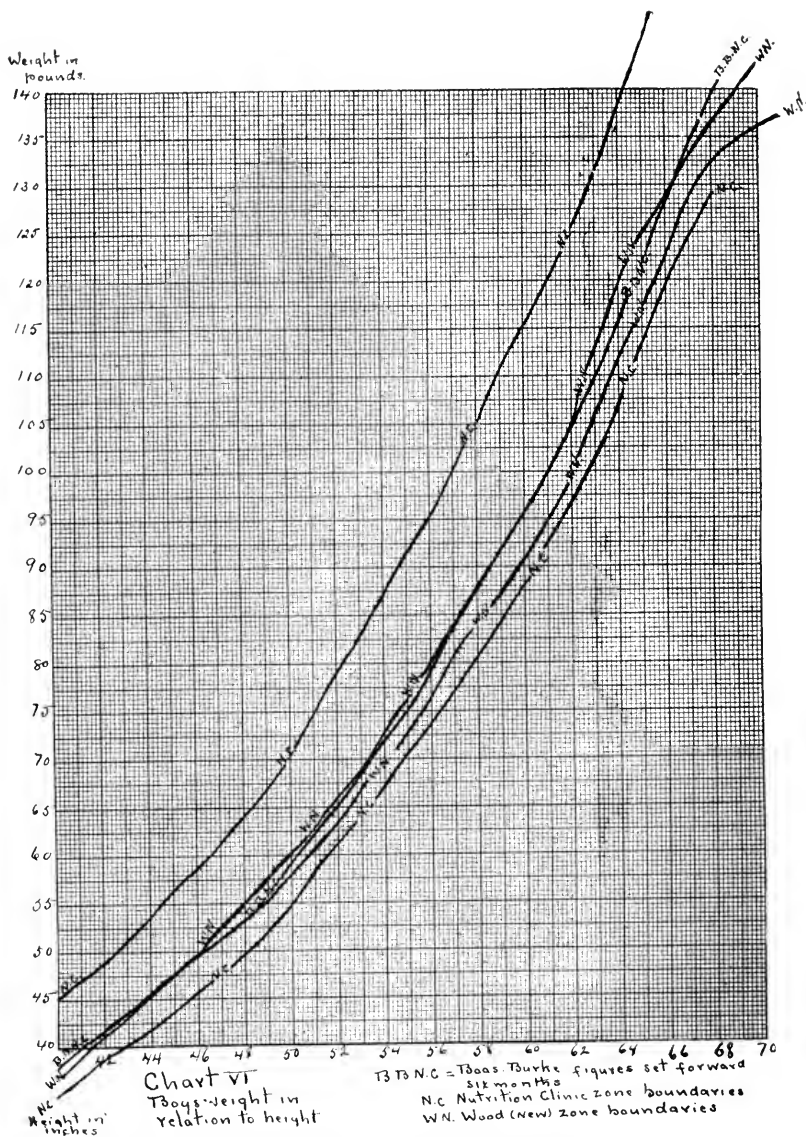
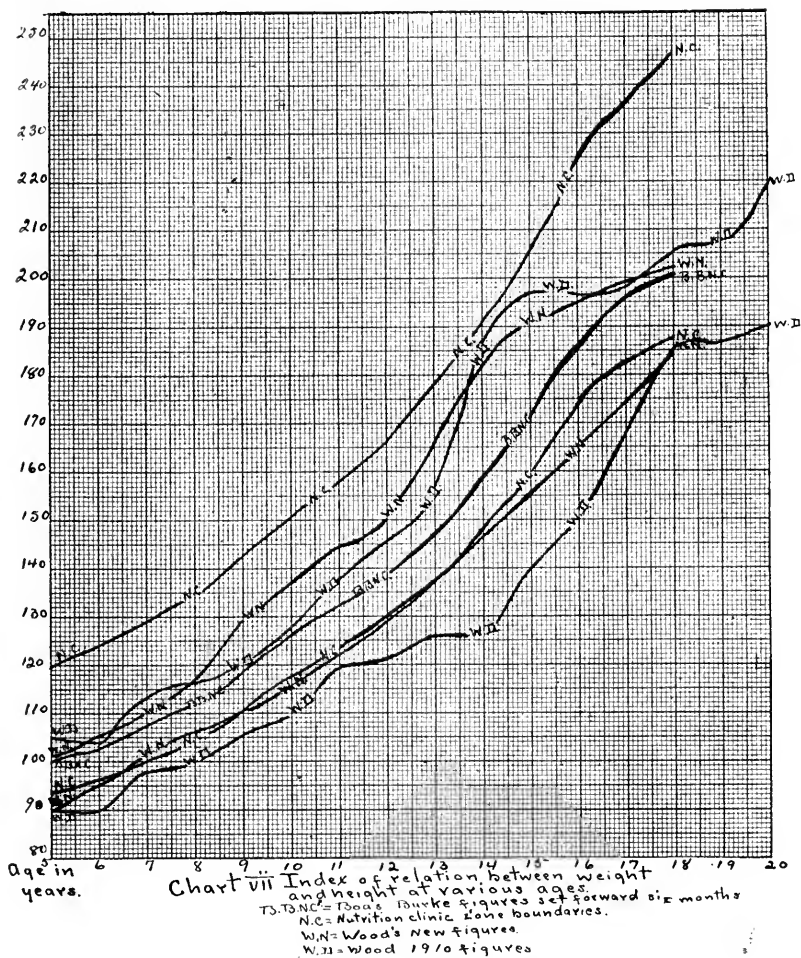


CHART VI shows the relationship between the zone boundaries which we use—7 per cent. underweight and 20 per cent. overweight for height—and those made by Wood for the use of the Child Health Organization. Note how closely Wood's lines follow the "set forward" Boas-Burk figures which we use as a basis. Wood's zone of health is much narrower than our clinical evidence justifies.

Index
Weight in pounds divided
by height in inches



In Chart VI the comparison was kept to the relationship between weight and height, but in CHART VII the factor of age is also used. The weight and height factors are combined by using an index secured by dividing the weight in pounds by the height in inches. In addition to the figures prepared recently by Wood we have also included those which he published in 1910. Note that both his lower and upper zone boundaries are, on the whole, much higher in the later edition.

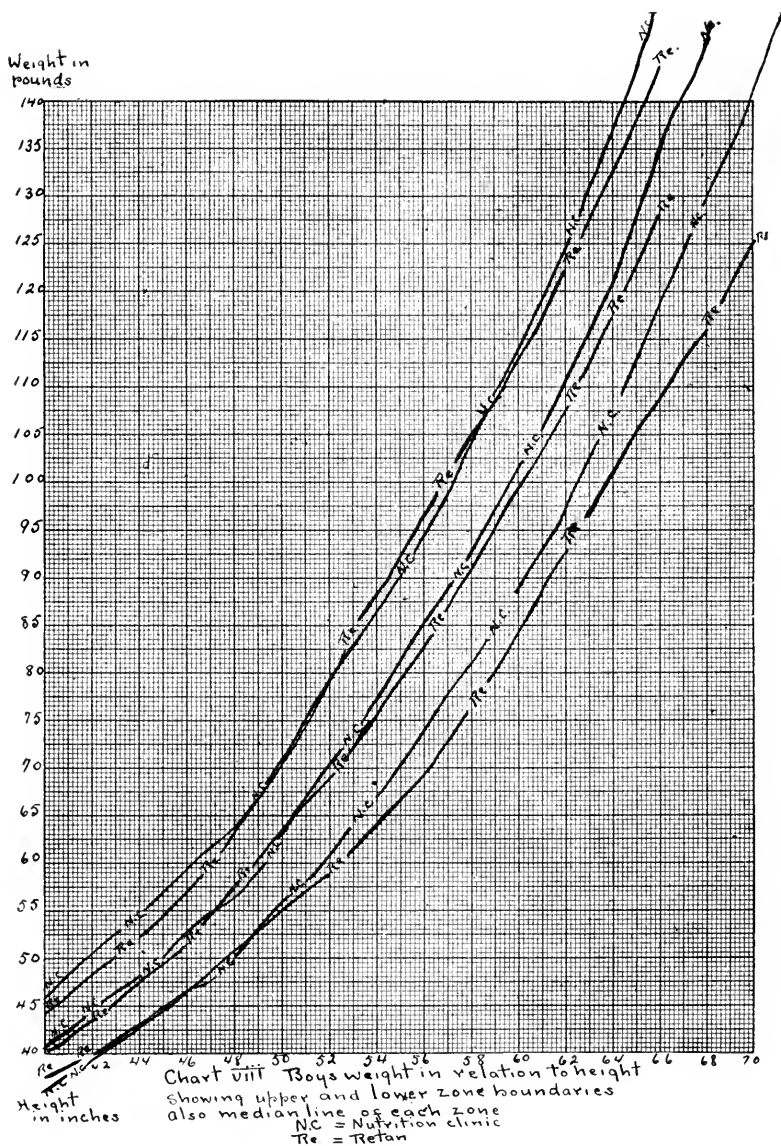


CHART VIII shows the zone boundaries determined experimentally by Retan. In plotting all children examined he made use of our general boundaries and then laid out his zones according to the actual location on the chart of obese and malnourished cases. The general agreement of the two sets of boundaries is here well illustrated.

nutritional condition. Starting with our tables, he has classified in zones all the children examined. The result reveals the malnourished children collected in the range of unsatisfactory relation between weight and height. Chart VIII shows how closely his evidence agrees with the boundaries we have worked out.

Sex and race variation. Sex variation is an interesting study in itself, but in the practical consideration of children up to the age of adolescence there is no reason for discussing the subject in this article. Therefore space has not been taken to publish parallel charts for the two sexes. To make comparison easier all the charts used are those showing the heights and weights of boys.

An objection frequently raised is that no single range of averages can serve for the various nationalities in an American city. We have tested our tables on the mixed population of several schools, and find that our range makes sufficient allowance in dealing with even the Italians and other types considered farthest below the average.

Seasonal growth. A section of this subject deserving special study is the matter of seasonal growth. It is commonly held that during certain parts of the year growth in weight leads, while growth in height is especially characteristic of other seasons. A summary of the literature of the subject is found in Hall's "Adolescence." Reference is made in the latest edition of Holt's "Diseases of Infancy and Childhood" to a study of 700 observations made on boys ranging in age from 9 to 16 years in a New York private school. This showed the period from May to November to have a decided advantage over the other 6 months in both weight and height increases. This result is ascribed to the greater freedom from illness and the larger opportunities for outdoor life during the open months. Added interest is given to this statement in the light of our experience which shows nasopharyngeal obstruction to be the most seriously disturbing physical factor with which we have to deal.

SUMMARY.

- (1) Malnutrition is a definite clinical entity with characteristic history, definite symptoms and pathological physical signs.
- (2) Clinical evidence shows that the physical sign which may

best serve to identify this group of malnourished children is the relationship existing between weight and height.

(3) The age factor is of secondary importance and is mainly serviceable in selecting cases stunted by constitutional disabilities such as syphilis, tuberculosis, deficient thyroid, the effect of certain drugs, convalescence from long illnesses, etc.

(4) The tables derived from the studies of Boas and Burk represent the most extensive records of weight and height measurements made. Recent studies show that they are essentially true averages of unselected groups of American children.

(5) The Boas-Burk and other tables in general use are vitiated by the fact that they include a large number of malnourished children whose measurements lower the averages of weight and height, thus making them of relative value only as standards.

(6) As a working basis it has been found necessary to set forward the Boas-Burk figures half a year, thus offsetting to a considerable extent the depression of averages stated above.

(7) Individual variation in the relationship of weight to height is of sufficient importance to make it necessary to use a zone system rather than any single line as a basis of reference.

(8) After various experiments at determining zone boundaries, clinical evidence is best satisfied by lines lying between 7 per cent. below and 20 per cent. above the "set forward" Boas-Burk figures. Outside of this central zone are found, on the one hand, the malnourished, and, on the other, the obese. Within the zone are still a considerable number of malnourished children requiring individual diagnosis.

(9) The malnourished children selected by this rule of habitual 7 per cent. underweight for height form, almost without variation, 20 to 40 per cent. of any group of children in school and pre-school periods.

(10) When tables have been constructed from a sufficient number of children proved to be normal, the line of average weights and heights will lie somewhere between the "set forward" Boas-Burk figures and those represented by a line drawn

midway between the 7 per cent. underweight and 20 per cent. overweight boundaries of the zone described above. Special studies of somewhat more carefully selected children, for example, those made by Baldwin and Robertson, confirm this statement.

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CASE OF INTUSSUSCEPTION TREATED BY RESECTION (Lancet, May 31, 1919, p. 938). E. R. Flint's patient was aged one day less than three months. He believes that this is the youngest case on record in which recovery took place. The ileum (4 or 5 inches of it) had slipped up into the cecum and colon. This portion of the ileum was removed in the usual way.—*Journal A. M. A.*

FURTHER STUDIES IN THICK CEREAL FEEDING IN MALNUTRITION IN INFANCY.

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In August, 1919¹, I reported 12 cases of malnutrition in infancy, fed by means of a modified thick cereal formula. Since then I have been making further studies along these lines, and am recording in particular from a series of 10 cases, 2 cases referred to me in private practice, both of which started as difficult feeding cases, and resolved themselves into easy normal feeding problems.

In regard to the preparation of the thick cereal formula, some essential modifications have been made. A fat free milk, or one which averaged under 1 per cent. in fat was used as the liquid basis of the mixture. It was assumed, empirically to be sure, that these babes would not tolerate or assimilate fat. No laboratory work, with the exception of examination of the stools, was done to confirm this, but the fact remained that clinically, high fat and whole milk fat had been previously used in the majority of the cases, and that the babies had not done well on it. Another factor which influenced me in using low fat skimmed milk was its comparatively high proteid and salts content, in addition to the actual food value of 10 or 11 calories per ounce which the mixture gained. If the cereal is made up in water, these needed calories and salts are lost. The cereal used by preference was farina on account of its colloidal qualities. The reason for this follows: Starch in solution acts as a protective colloid and in this way prevents the formation of hard casein curds with possible difficult digestion. This action is due to the soluble starch itself and not to the salts or the cellulose in suspension. In a previous series of cases, rice flour, as recommended by Porter² in pyloric stenosis, was used in a few of my cases. This was abandoned in spite of the fact that it was more soluble and had better protected colloids than farina. The reason for abandoning it was the increased tenaciousness of farina over rice flour, and the fact that to get the same thick mixture almost twice as much rice flour was needed.

The proportion of this present mixture used was increased

to 1 tablespoon of farina to 5 or 6 ounces of the skimmed or fat free milk. Cane sugar and dextri-maltose were added in equal quantities, using 2 level tablespoons of each to 30 ounces of the mixture. All this was cooked from 30 to 60 minutes, or until the resulting mixture was thick and tenacious. Thorough cooking is most important and will clear up many cases of loose stools which may have occurred from undercooking.

As a rule, however, there is not the increase in the number of stools that one would expect to find from the high sugar and starch content. The reverse, or a tendency to constipation, is generally the rule. This is probably due to the following factor: It has long been a recognized fact that a combination of several carbohydrates in the same food can be given without taxing the power of the organism to utilize sugar, whereas when a single carbohydrate is used this may not be the case. The farina mixture, being a "polycarbohydrate" mixture of milk sugar, malt sugar, cane sugar, dextrans, and starch, comes under this category. The malt sugar is absorbed first, then the cane sugar and milk sugar, next the dextrans, and finally the starch. This absorption is slow and will continue for a long time. The organism is thus enabled to utilize the sugar without a sudden overdose, and accordingly the child gains and there is not the tendency towards a carbohydrate diarrhea which we might expect to get with a single carbohydrate. In this connection I may state that the fear of feeding high sugar in most cases is groundless. I have seen children fed on as high as a 16 per cent. sugar with no ill results. To quote Morse and Talbot: "The probable reason that babies can take carbohydrate in the form of starch (farina) when they cannot take it in the form of dextrans and sugar, is that the molecular structure of starch is more complicated than that of the dextrans and sugars. The more complicated the structure of a carbohydrate is, the more numerous are the steps in its breaking down to its end products. There is therefore, less fermentable material in the intestine at one time, and less opportunity is afforded for fermentation to get the upper hand."

When first put on this mixture, there is usually some difficulty in getting the baby to take the spoon feeding. To solve this problem, the cane sugar, being much sweeter than the dextri-maltose, should be increased accordingly, and the child will generally take it. There also may be gagging, and in some

cases vomiting until the infant is thoroughly accustomed to such a radical change in its diet. I have found that a good many of these slow gainers have signs of pylorospasm. In a large percentage of the cases seen by me, this has ceased after a few weeks use of the cereal, and the vomiting stops. In these cases there is always difficulty in getting the child back on milk formulae, so much so that they tolerate milk badly for a long while.

When the child is well accustomed to the mixture and has started to gain, from 2 to 6 ounces of a green vegetable purée is added. This may be used as early as the 6th month. Celery, string beans, spinach, carrots and young turnips were the vegetables of choice. These supply not only a few extra calories, but also salts, and the anti-neuritic or water soluble B. vitamine. The combination of these, plus the high starch, may very well be a factor in increased growth and nutritional improvement. Here again my observations are clinical and not sustained by laboratory findings. Byfield⁴, in a series of experiments, reaches these conclusions:

1. The addition of the anti-neuritic vitamine, obtained from wheat embryo to the diet of babies supplied with food furnishing an adequate number of calories, stimulated growth.

2. The beneficial influence of adding a specially prepared vegetable soup in sufficient quantity as part diluent of the milk modifications for infants is apparently due to the presence of the anti-neuritic vitamine contained therein. Both the alcoholic soluble material of the dried soup vegetables, and the water extract (soup) stimulated growth.

3. The fact that the artificially fed infant requires a larger amount of food than the breast fed infant appears to be due to the relative paucity of cow's milk in the anti-neuritic vitamine.

4. It is probable that the failure to gain in infants and young children is often the result of an insufficient amount of the anti-neuritic vitamine in the food.

Hess⁵, in his studies of infantile scurvy, has also noted the same phenomenon. He used a cereal of wheat middlings and farina, and remarked on the immediate and striking improvement in the turgor, and noted that there was a gain in weight for the first time in many months. In the cases I have seen, these findings are somewhat obscured by the high caloric value content of the thick farina, skimmed milk, high sugar mixture. It is ob-

viously more reasonable to attribute the gain to the cereal feeding rather than to the vitamins contained in the green vegetables. The combination of the two undoubtedly helped, and the vitamins must not be lost sight of in spite of their intangibility. Of greater interest is the extremely high calories these babies can take, in many cases over double the number of calories required by their weight. It is my personal feeling that infants may also be kept on thick cereal for a much longer time without an upset than they can on other high caloric feedings, including the whole lactic acid milk, corn syrup method of Marriott.

Both methods, however, add to our feeding armamentarium. The idea is not altogether a new one but is an adaptation of, or a reversion to early methods of infant feeding. Harking back to the Elizabethan age, and to the centuries preceding it, breast feeding was practically the only means of nourishing a young infant or child⁶. Cow's milk was only mentioned to be condemned. Feeding bottles had not been invented, and the artificial foods were limited to water pap (bread and baked flour soaked in water) and pulse, which was a combination, or porridge of peas, beans and lentils. Here we have a similar combination to the one employed in our farina and vegetable soup mixture, and one on which the children of that age thrived.

I have picked out the following 2 typical cases. The other 8 are all very similar in character:

CASE No. 1. C. H. Born April 11, 1919. 4th child. All living and well. Father and mother living and there are no familial diseases of any sort. Easy, normal, noninstrumental labor, and child was normal at birth. Birth weight, 7 pounds, 11 ounces. Seen on June 6, 1919, when the weight was 10 pounds and 4 ounces. Examination revealed an apparently normal baby, the only abnormality noted being large tonsils and adenoids.

Feeding history: Breast fed since birth, 10 minutes on each side, 6 feedings, 4 hour intervals. As the breast milk was diminishing in quantity and in quality, the baby was gradually weaned until on June 26 he was on whole milk, 15 ounces; boiled water, 14 ounces; lime water, 1 ounce; and milk sugar, 3 level tablespoonsful. 5 ounces were given 6 times a day, every 4 hours.

July 12. As the baby had been spitting up a little bit he

was put on a skimmed milk mixture. The weight was 10 pounds and 5 ounces, a gain of only an ounce in over a month.

July 16. Not satisfied. Increased to 2 per cent. milk, same formula. Same weight. Still spitting up small fat curds after every nursing.

July 18. Weight still stationary. As milk was from a Jersey herd, formula was changed to Dryco dry milk, 4 tablespoons; dextri-maltose, 1 teaspoon, to 5 ounces of boiled water, 6 feedings every 4 hours.

July 25. Weight, 10 pounds, 15 ounces, a gain of 10 ounces in the week. This gain unfortunately was only temporary for in the following 10 weeks the baby only gained 21 ounces. Many formulae were tried, including Walker-Gordon milk, cereal, beef juice, orange juice. He was overfed and underfed in milk calories, with low fat and high sugar, and high fat and low sugar, and a combination of them both. He was always somewhat constipated, although his foods were all well digested.

When seen on October 1, the chief complaint was failure to gain properly, and a very occasional spitting up. Weight was 12 pounds and 4 ounces. Having the experience of my first series¹ in mind, I put the baby on the following formula:

Two per cent. milk, 28 ounces.

Farina, 6 level tablespoonsful.

Dextri-maltose No. 3, 2 level tablespoonsful.

Cane sugar, 2 level tablespoonsful.

This was boiled together for 30 minutes, divided into 6 feedings, and the baby was fed it with a spoon. The required calories, figuring on 45 per pound were about 550, the estimated calories being almost 800. There was an immediate change for the better, almost startling in character. The weights for the next 3 months follow:

October 3. Weight, 12 pounds, 11 ounces.

October 12. Weight, 13 pounds, 11 ounces. This is a gain of 23 ounces in the past 11 days. Is taking cereal well.

October 19. Weight, 14 pounds, 7 ounces. 2 to 4 ounces of either spinach or string bean purée was added to the cereal.

November 4. Weight, 15 pounds, 10½ ounces.

November 20. Weight, 16 pounds, 8 ounces.

December 5. Weight, 17 pounds, 2 ounces.

December 12. Weight, 17 pounds 14 ounces.

December 26. Weight, 19 pounds, 7 ounces.

This is a gain of 110 ounces in 86 days, or an average of about 9 ounces a week. During November, orange juice, beef juice and baked potato were gradually added to the diet. At no time was there any edema, or any evidence of water retention. The urine was always free from sugar, and the stools were normal, well digested, pasty stools. The only fluid allowed was water, and this was given twice a day in amounts varying from 4 to 8 ounces. The child weighed 25 pounds when 1 year old and was normal for his age.

This case is typical of a great many. Having observed 2 series of cases, comprising 22 in all, I feel that this method of feeding will prove of great value in selected cases who gain badly or extremely slow. I have had cases in which improvement was very slow, and where the cereal was not well tolerated. At the same time, in at least 8 cases out of 10, it worked splendidly. The 2 cases which did not gain well on it were types which would not gain well on other diets. In one hospital case and in the case report which follows, it will be seen that the child did better on the cereal than on anything else, although the final result was somewhat disappointing.

CASE NO. 2. G. E. Born June 10, 1919. Father and mother are living and well. Mother is 40 years old. Labor was difficult, high forceps being used. Baby was normal at birth, as far as the mother knows. Birth weight, 7 pounds, 7 ounces. Negative familial history for either tuberculosis or syphilis.

Feeding history: Breast fed for 2 months. Weight at 2 months, 9 pounds. Was then weaned and was put on a formula of milk, water, and cane sugar. At 10 weeks of age, was put on a Horlick's malted milk mixture. Was a vomiting baby from birth. From 11 weeks of age, until seen by me on October 24, 1919, has been on a formula of milk, 3 ounces; water, 2 ounces; and granulated sugar, $\frac{1}{2}$ teaspoon, 7 feedings, every 3 hours. Stools have always been constipated, with a foul odor, and with small white curds. Has frequent colic, and vomits after almost every feeding.

Physical examination, October 24, showed a marantic baby weighing 9 pounds, 8 ounces, otherwise perfectly normal. An opinion was given of indigestion from too much at a feeding, too concentrated food, and high fat, and a formula was given her of skimmed milk, 18 ounces; boiled water, 10 ounces; lime water, 2

ounces and dextri-maltose, No. 1, 3 level tablespoonsful. 5 ounces, 6 feedings.

October 27. Weight, 9 pounds, 9 ounces. Vomiting improved but is very hungry and fretful. $5\frac{1}{2}$ ounces were advised with 6 feedings. This was continued until November 5, when the weight was 9 pounds, $9\frac{1}{2}$ ounces. Vomiting had entirely ceased, and the baby looked somewhat better. In the next 2 weeks, the milk was gradually increased to 2, 3 and 4 per cent. milk as the baby was always hungry. On November 14, a change was made to Dryco dry milk, and 2 teaspoons of farina were given twice a day. Weight was 9 pounds and 12 ounces. This was kept up until November 24, and as there had been no gain, a thick cereal feeding was ordered of:

Two per cent. milk, 28 ounces.

Farina, 5 tablespoonsful.

Dextri-maltose, 2 tablespoonsful.

Cane sugar, 1 tablespoonful.

This was cooked 30 minutes and divided into 6 feedings. On December 1, as the cereal seemed to gag the baby and she was taking it badly, the cane sugar was increased to 2 tablespoonsful, and the dextri-maltose decreased to 1 tablespoon. Two days later the cereal was increased to 6 tablespoons. Weight then was 10 pounds.

December 8. Weight, 11 pounds, $3\frac{1}{2}$ ounces. Whole milk used.

December 15. Weight, 11 pounds, 8 ounces.

December 22. Weight, 11 pounds, 11 ounces. Baby is satisfied in every way, and has gained for the first time in 2 months.

December 29. No gain. Thinking that the baby had perhaps been overfed, I advised taking her off the cereal, and putting her on a 2 per cent. milk mixture, with double strength barley water, and the same amount of sugar.

December 31. Baby started to vomit again. Sugar cut down to 1 tablespoon of dextri-maltose.

January 2, 1920. As baby was still vomiting, she was put back on a 1 per cent. milk, farina mixture. From this time on a slow but sure gain followed. The child was seen monthly and on May 27, when she was not quite a year old, she weighed 16 pounds, and 9 ounces, and had progressed well physically in ever way.

Here is a case which looks like a failure at first glance. However, various elements enter into the case, the mother's age (40), the long protracted difficult labor, and the bad previous feeding history. The home hygiene was carefully looked into; the mother was a sensible woman who took complete charge of the baby herself, so that the hygiene cannot be blamed. Certainly the child gained better on the cereal feeding than on anything else, and its vomiting has stopped. Incidentally the green vegetables were added in February in a similar manner to that used in case No. 1. It is possible that this particular child may be one of those indefinite forms of malnutrition due to a slight brain injury at birth, which presents a symptomatology which is recognized, but about which little is known. The case is cited to prove that this feeding method is not a panacea for all feeding ills, and does not work in every case.

CONCLUSIONS.

1. A method of feeding difficult cases is reported.
2. In selected cases marked gain in weight, and improvement physically has been noted.
3. It is not a cure-all, but is a valuable adjuvant in infant feeding.

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VITILIGO MASK WITH INHERITED SYPHILIS (*Rivista di Clinica Pediatrica*, Florence, May, 1919). Lutati reports two cases in which children of 7 and 11 presented vitiligo of the face alone, with some asymmetry of the face. The parents of both were syphilitic. The vitiligo had begun to develop three and five years before, and at date of writing formed as it were an actual mask over the face. The Wassermann reaction was positive only in one of the children, but both showed other stigmata of syphilis.—*Journal A. M. A.*

SOME EXPERIENCES WITH MALARIA AMONG CHILDREN IN PALESTINE*

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In June, 1918, a group of physicians and nurses, comprising the American Zionist Medical Unit, left here to do medical work among the civilian population of Palestine.

After over 2 months of traveling, our unit finally reached Palestine, and I was detailed with a group of physicians and nurses for duty in Jerusalem. We arrived at the height of the summer heat and the malarial season. I shall never forget the warm reception we received from the mosquitoes, sand-flies and other insects. Our mosquetaires had not yet arrived, and sleep was absolutely out of the question. The city of Jerusalem is situated about 2700 feet above sea level, on dry stony land, and the climate is delightful except for a couple of months during the year, when it becomes very hot, but the nights are invariably cool. Whence then the mosquito? Jerusalem has no water supply of its own, and the inhabitants depend for their supply on what is collected during the rainy season. This is stored in cisterns underneath the houses and must last throughout the dry season. Where the cisterns are small, or when there has been inadequate rainfall, the cisterns run dry, and water becomes a luxury which must be purchased. Needless to say, when such a contingency arises, the use of water except for drinking and cooking purposes, is considered superfluous. The cisterns themselves furnish an ideal breeding place for mosquitoes, and a fine source of infection for typhoid epidemics and other water borne diseases. While malaria is present to some extent the year around, there is a marked increase in spring, beginning in April. There is a rapid rise for about 2 months, then a short period of decline followed by another rise toward the end of July, lasting until about the middle of October. The health conditions during the winter months or the rainy season, are as a rule good.

My work commenced the second day after arrival, in a small children's hospital which had been opened during the war. There were 25 beds, and at that time, the service consisted of cases of

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malaria, dysentery, gastrointestinal conditions, pneumonia, typhoid, and influenza. Clinics were held daily, and were filled to overflowing, this being the only children's clinic in the city, and we saw daily from 100 to 200 patients. Under the circumstances, it was impossible to make anything more than the most superficial kind of examination, weeding out and giving more care to those children who appeared very ill. I spent 2 months altogether in Jerusalem, and then as Palestine was opened up by the rapid and spectacular advance of General Allenby and his forces, detachments of physicians and nurses were sent north to take care of the civilian population in the newly opened territories. Stations were opened in Tiberias, Safed, Haifa and Jaffa, and I was sent to the latter city. A composite picture of my impression of the babies that I had left in Jerusalem, can be summed as a something that bore only the remotest resemblance to an infant. It consisted of a tremendous abdomen, filled mostly by spleen, with a tiny chest, a head and little thin extremities stuck on as accessories.

In Jaffa, the first few months of our work was also purely relief work among the refugees who had been driven out of their homes by the Turks. Many of these had gone up to Galilee, and were now returning to their homes as fast as they could get there. They came down on foot, in rickety old carts and wagons, on donkeys and camels, bringing their few rags and the remains of their worldly goods. Before the war, there had been very little malaria in Jaffa, but the majority of those who had been exiled in Galilee, were infected. The disease had been aggravated by the hardships they had endured, when left without homes, shelter or food, and also by the lack of quinine at various times during this stormy period. An emergency hospital and clinics were immediately opened to take care of these refugees, and I took charge of the children's work here. Later a small children's hospital of 20 beds was opened, which was quite a model for that part of the world, and here as well as in the clinic, we commenced to keep a more or less detailed record of work. This was no easy task, as we had only a very small staff at our disposal. Altogether we treated over 2000 cases of malaria among children.

Our clinic routine was as follows: Each patient, on its first visit, had a complete physical examination, blood smear taken,

and if under 2 years of age, was also weighed. Notes were made of any abnormality, and the size of spleen indicated in every case. The frank, open, classical cases of malaria offered no difficulty in diagnosis, but we soon found that malaria offered every symptom and symptom complex conceivable, and simulated almost every disease known to pediatrics. Not only that—cases of pneumonia, typhoid and influenza caused a lighting-up of latent malarial processes, often obscuring the entire clinical picture. It was no unusual thing for a child to be brought into the clinic with a temperature of 105° or 106°F., and we soon found that there was such a thing as a typical malarial facies, that was almost diagnostic. The pinched ashy blue or yellow color, blue lips, anxious drawn nostrils, and beads of perspiration on the forehead were unmistakable, and in walking through the clinic waiting room, I would pick out these acutely ill patients for immediate attention.

In comparing the symptoms of malaria in children with those in adults, there were several outstanding features. The chill is less frequently an initial symptom. On the other hand, there is a greater tendency to convulsions and other nervous manifestations such as restlessness, twitchings, fretfulness, or drowsiness. In addition, in the children under 2 years, there were very frequently gastrointestinal symptoms such as vomiting, constipation, diarrhea, and occasionally bloody stools. Also the interval between the attacks was, as a rule, marked by a striking return to normal appearance. It was not at all unusual to see a child, who at the height of the attack appeared desperately ill, seem in a few hours to be perfectly well. There was a much greater tendency to irregularity in temperature than in adults.

The youngest patient was an infant only a few hours old. The mother had suffered from chronic malaria for several years, with acute exacerbations from time to time. During this present pregnancy, she came to the clinic while in her seventh month and had received quinine hydro bromide together with morphine sulphate in very small doses. This seemed to keep the fever in check, although her blood would from time to time show tertian organisms. I was called to the patient's home by the midwife in attendance, when the baby was 12 hours old. It looked blue and cold, face drawn and pinched, pulse feeble and very rapid. In view of the mother's history, a blood smear was taken at once.

A few tertian parasites were found. Four hours after I saw the infant, its temperature rose to 105°F. and quinine was ordered immediately in doses of one grain every 2 hours. There was only a slight rise of temperature on the third day, and no recurrence. The majority of authors do not believe that congenital malaria occurs, although a few cases have been reported. Altogether there were treated 59 cases in infants under 1 year, and of these, 7 were under 1 month.

In the group with gastrointestinal symptoms, a good many had simple diarrhea as the outstanding feature. Three cases had bloody mucous stools as the only important symptom, and the history of 1 of these is of special interest because of the number and type of relapses. A sturdy, well-nourished youngster of 3 years was brought to the clinic with a history of bloody mucous stools, 8 to 10 daily, tenesmus, and afternoon temperature for the past 4 days. He had had malaria 6 months previously. On examination the child appeared pale, temperature 101°F., spleen 2 fingers below rib margin; otherwise abdomen and rectum negative. Blood smear negative for malaria; stool showed no dysentery. In the hospital the child ran an irregular temperature up to 102°F., and showed absolutely no response to any treatment directed to the local condition. Finally, it was decided to give the child quinine, in spite of the negative blood smear. He would not tolerate it by mouth, so it was given by hypo. After the second dose, the temperature dropped to normal, and remained so, the stools diminished in number and improved in appearance, and after 6 doses were perfectly normal except for traces of mucus. As the child appeared anemic, it was given Fowler's solution and quinine in small doses together with licorice, which he was able to retain. When he was discharged, the mother was instructed to continue the quinine and Fowler's solution, and to bring him to the clinic once a week for observation. This she did for 3 weeks, and then we saw nothing of the youngster for 4 months, when he was brought in with a recurrence of all his previous symptoms. He had received no quinine for over 2 months, and had been apparently quite well during that period. At this time the examination of the blood revealed a few tertian parasites. Treatment with quinine was immediately instituted together with other measures, and the attack was promptly controlled. The child was brought back once more,

shortly before I left Palestine, with another recurrence of the same type.

Another case with gastrointestinal symptoms, simulated an attack of appendicitis. A boy of 8 years was brought to the clinic suffering from intense pain in the abdomen, nausea, vomiting and constipation. The patient had been ill 2 days. He appeared quite prostrated, face ashy and pinched, extremities blue and cold, pulse rapid and feeble, temperature 104°F. Spleen was only slightly enlarged, but there was decided rigidity on the right side, and tenderness over the appendix. He was admitted to the hospital with a diagnosis of acute appendicitis, and expectant treatment ordered. We had no ice, so cold compresses were applied, while advisability of immediate operation was considered, but it meant either bringing a surgeon down from Jerusalem, or transferring the patient over 40 miles of the roughest kind of roads through the hills, so I decided to watch and wait. Blood smear examined immediately showed no malaria, and a blood count gave 15,000 leucocytes with 68 per cent. polys. This seemed to confirm the diagnosis as in malaria there is usually a leukopenia. After a few hours, however, the child showed some signs of improvement, and the temperature fell to 102°F. At the end of 6 hours, temperature was normal, and the child appeared perfectly comfortable, his color was good, although there was still considerable rigidity and tenderness. Food and medication by mouth were withheld, and at the end of 36 hours, child again became restless, complained of pain and vomited. Temperature rose to 103.8°F. Another blood smear taken at this time showed tertian parasites. Injection of $\frac{1}{2}$ gram quinine was given immediately. After a few hours the temperature again dropped, child began to improve, and 24 hours after the second dose of quinine, there was practically no rigidity or tenderness. Although the temperature rose on the following days to 101° and 100°F., there was no further recurrence of the previous symptoms.

The group of cases with pulmonary symptoms offered many difficulties in diagnosis, especially as the influenza epidemic appeared at the height of the malarial season, and one condition complicated the other. Of course, where malarial organisms were found in the blood there was no question, but in a certain percentage of the cases, where the indications pointed to ma-

laria, or where temperature and symptoms did not clear up, quinine was given despite the negative smear with prompt relief of symptoms. Many of these were latent cases lighted up during the period of lowered vitality attendant on the influenza. On the other hand, there were cases with signs simulating pneumonia, which were undoubtedly malarial in origin. One of these cases is that of a well nourished little girl of 4 years, who was taken suddenly ill with convulsions. On admission child had temperature of 105°F., pulse 160, respiration 60. Spleen was slightly enlarged, area of dullness at left apex, with bronchovesicular respiration. The following day there were a few fine crepitant râles in this area, temperature had dropped to 99.4°F., but respirations were about 45, and the child appeared ill. On the third day there was another convulsion, with temperature rising to 105.8°F. At this time a blood smear was examined and organisms found. Quinine was immediately given by hypo in doses of $\frac{1}{2}$ gram twice daily. Following the administration of quinine, there were no more convulsions, though the temperature rose to 101° and 102°F. on the following two days, and the râles persisted. The third day after the administration of quinine, there were no râles, temperature was normal, and the patient felt perfectly comfortable. Two months later the patient had a recurrence with almost identical symptoms, and another 3 months after that. In the interim the child appeared perfectly well, except that he became pale. After the third attack I advised the mother to take the child up into the mountains for change of air, and at last report he was doing well and had had no more recurrences.

A case of cerebral malaria occurred in a child of 11 years. He was brought in during a convulsion. Examination of the blood was negative. After the convulsion, temperature was 104.8°F., child appeared stuporous, cried when disturbed, or from time to time emitted a sharp cry. The head was retracted, there was a Kernig and exaggerated reflexes. The pupils were equal and reacted promptly to light and accommodation. Lumbar puncture gave clear fluid under moderate tension, and laboratory examination was negative. On second day the condition was practically unchanged, although toward evening the temperature rose to 105.6°F., and child became very restless. Blood smear taken at this time revealed the aestivo-autumnal parasite. Quinine

was given by hypo and 24 hours later the child appeared quite normal, although there was still some rigidity of the neck, and Kernig was still present. Altogether there were 60 cases ushered in by convulsions in our series.

The blackwater fever cases are not common in the lower part of Palestine or Judea, but we had 4 cases of the malignant form of malaria associated with hemoglobinuria. There is a tradition among the laity and a good many of the physicians there that quinine taken during the height of the fever will cause this condition. In reviewing the literature, I find there are still 2 distinct schools, one of which gives quinine during an attack, and the other absolutely forbids its use. One of my cases presented an interesting phenomenon. A girl of 14 was brought down from Galilee, having traveled 3 days in an old rickety wagon with her family. They were refugees who were returning to their home in Jaffa. They had all suffered from malaria, and the patient had had a chill followed by fever while en route. When seen, she was extremely ill, comatose and delirious by turns, temperature 103°F. , rapid and sighing respirations, rapid pulse, skin and conjunctivae jaundiced, and the extremities cold. The bowels had not moved in 3 days, and she has passed small quantities of bloody urine. She was given a dose of castor oil, a high soapsuds enema, warm bath, heat was applied to the extremities, and caffeine sodium benzoate and camphor by hypo; also calcium chloride 30 grains. On the first day she passed 300 c.c. of dark red urine. Examination showed high specific gravity, heavy albumin precipitate, and loads of red cells. The case gradually cleared, but there was a temperature of 100° , or 100.5°F. , which persisted, the spleen was enlarged almost to the umbilicus, and there was extreme pallor. Small doses of quinine hydro-bromide and Fowler's solution were given. Temperature became normal and the spleen decreased somewhat in size. She continued to improve until discharged from the hospital, and the nurse was directed to give her a supply of quinine hydro-bromide. The mother was given instructions on the general care, and was told to bring the child to the clinic weekly for observation. At about 10 o'clock the following evening, the child was brought into the hospital, and I was hurriedly summoned. I found her again in a state of collapse, with rapid feeble pulse, cold extremities, anxious pinched face, and

subnormal temperature. The mother stated that she had given the child 2 of the pills and at about the time the third one was due, the child passed some bloody urine, and shortly after that, had become ill. It developed subsequently that the nurse had given the mother 5 grain pills of quinine sulphate, and the attack had come on after having taken 10 grains of this preparation.

Enlarged spleens were noted in 70 per cent. of the children treated, the spleens varying in size from those that were easily palpable below the rib margin, to those that extended into the pelvis. In some cases the rapidity with which the spleen increased and decreased in size and consistency was remarkable. The chronic cases all had tremendous spleens and were hard to treat. Many of these ran a daily temperature of 100° to 101°F. and were extremely anemic. But one of these was particularly gratifying. A boy of 12 was brought from the orphanage, complaining of pain in the back. The attendant stated that the boy complained constantly and would not participate in any of the boys' games or exercises. Nothing was known of the boy's previous history. He was a very pale, thin child, with a spleen reaching 2 fingers below the umbilicus. Examination of his blood showed tertian parasites. He was put on a course of quinine and Fowler's solution. A suspensory belt of adhesive was applied to the spleen region and an abdominal binder put on. He was brought back in a week with the spleen at the umbilicus. The pain was considerably decreased, and the boy's color was slightly improved. At the end of a month the spleen was 2 fingers below the rib margin, and at the end of 2 months, the spleen was scarcely palpable. His color was good and the pain was completely gone.

In the treatment of our cases, quinine was given by mouth in all the simple cases. Where it was tolerated at all, it was given in fairly large doses. In a certain group of cases, it upset the stomach when given in simple solution, but when made up with a simple syrup or with licorice, it was better tolerated. A small percentage do not tolerate the quinine at all when given by mouth, and in these it was given in suppositories or by hypo. In all the cases where the attack was ushered in by a convulsion, or the symptoms were very severe, and in all cases of malignant tertian or aestivo-autumnal malaria, the quinine was given by hypo in doses of $\frac{1}{2}$ gram. All the quinine preparations are

very irritating when given in this way, although the hydrochloride and dihydrochloride are the best, but it must be carefully given. When we first came to Palestine, we saw many cases of abscesses and sloughing following the administration of quinine by the local druggists and other attendants. In one case particularly, a slough was removed leaving a cavity as large as a fist. In our series, we had 2 cases where sloughing occurred, and in both instances, the injection was given with a short needle into the fatty tissue of the buttocks. In the majority of cases, there was no difficulty in controlling the acute attack, where the quinine was taken regularly, and attention given to other measures such as rest, proper hygiene, and simple nourishing food. Often cases treated at home did not respond, but on admission to the hospital would clear up promptly. I am convinced that many of the relapses are due to insufficient treatment, or improper treatment or lack of rest in bed. In this connection, I will say that it is very difficult to make the patients continue the quinine after they are over the acute attack, and the result is that they continue to harbor the organisms somewhere until such time as their vitality is lowered, and a lighting up occurs. Besides, these cases act as carriers, and keep up a vicious circle. The chronic cases are very resistant, but in some instances where quinine by mouth did not help at all, a course of 6 or 7 doses given intramuscularly, and then followed by quinine and arsenic, given in the ordinary way, showed marked and rapid progress. In 10 cases we used neosalvarsan intramuscularly, with apparent immediate benefit, but relapses occurred when they were not followed by quinine. Change of climate was found to be a very good adjuvant to the quinine.

In closing, it is necessary to emphasize the importance of making a very careful study of these cases in infants and young children, especially in known malarial districts, where the symptom complex of every disease may be obscured by a latent or complicating malaria.

SOCIETY REPORT

THE NEW YORK ACADEMY OF MEDICINE. SECTION ON PEDIATRICS.

Stated Meeting, Held February 12, 1920.

CHARLES HENDEE SMITH, M.D., *in the Chair.*

ENCEPHALITIS LETHARGICA.

DR. STAFFORD MCLEAN presented this child, whose family and personal history he said were of no interest. The child had been entirely normal until January 27, when it was noticed that she was drowsy. The following day the drowsiness had increased, and she remained in this condition until she was brought to the outpatient department of the hospital on January 30. The child was admitted to the hospital on January 31, and had remained in this condition for the past 13 days. The condition had changed but little from the time of admission except for an increased drowsiness. The child had a tendency to fall backward and to the left. There was a very feeble response to normal stimuli. The pharyngeal reflexes were normal. The heart and lungs were normal.

The physical examination showed a mask-like facies and a coarse tremor. The knee jerks were increased. There was no opisthotonos and no rigidity of the neck. The child would swallow food, if it was put into its mouth. The child had not spoken since in this condition. Two spinal fluid examinations had been made, both of which were normal, having about 5 cells, all lymphocytes. Two von Pirquet tests were made, both of which were negative. The eye grounds were examined 3 times and were negative. The blood count showed 10,000 leucocytes, 66 per cent. polymorphonuclears and 34 per cent. lymphocytes. The temperature had been above 100° F. only once, remaining for the greater part of the time around 99° F. In other words, temperature was not a feature of this condition. The child had not vomited. There were occasional periods of apnea such as one saw in meningitis. The child was spastic at times and relaxed at other times.

Discussion.—DR. FRANK J. BEVAN stated that with reference to the mask-like expression of the face, when the child first became ill, the mask-like expression was more decided than during the past 3 or 4 days when it had begun to show some expression. The child now cried and had some expression which Dr. Hunt regarded as evidence of improvement. During the first 10 days they had used gavage, but during the past 4 days this had not been necessary, so they felt that there was a tendency toward recovery.

DR. SMITH said that they had had 2 such cases that recovered and apparently those children who recovered were just as sick as those that died. They had had 3 or 4 of these cases at one time. They were strikingly like tuberculous meningitis.

DR. McLEAN said this was the third case they had had. The other cases were 1 and 2 months old. The earlier case had been in the hospital 6 or 7 months ago, and he had had a letter from the mother stating that the child was entirely normal except for a "weakness of the back."

In reply to the question as to how he would confirm the diagnosis of encephalitis lethargica, Dr. McLean said it was a very difficult matter to make a diagnosis in these cases, and he had arrived at a diagnosis largely by exclusion. It was not a tuberculous meningitis because the von Pirquet was negative, and the spinal fluid had no tubercle bacilli. It was not a brain abscess because there was no vomiting. The onset was too acute for a brain tumor; if it were an abscess, fever would be present and the blood count would be different. The onset did not suggest a polioencephalitis nor did the spinal fluid findings, and the lethargic state had lasted too long. Hence he had put the case under encephalitis for the lack of a better group. In reply to the question as to how the child was being treated Dr. McLean said the only thing they were doing was trying to keep up the nutrition.

DR. ELIAS H. BARTLEY said it was unusual to find a normal spinal fluid in these cases. He had usually seen an increased cell count but it did not correspond to that of tuberculous meningitis, but was somewhat similar to that found in poliomyelitis. Sometimes it was difficult to make a differential diagnosis between this disease and the cerebral form of poliomyelitis. While

it was unusual to find a normal cell count in encephalitis lethargica, he had no criticism of the diagnosis.

DR. SMITH said it was quite true that some of these cases had an increased cell count, but again some did not. It was interesting to see how many more of these cases there were this year than last. With the severe form of influenza, there were very few of these cases, while this year with the mild form of influenza they were seeing many more cases of encephalitis lethargica.

DR. HENRY DWIGHT CHAPIN said it would be interesting to make the differentiation between this disease and tuberculous meningitis but he would find it difficult to do this as he had seen only 4 or 5 cases.

DR. MCLEAN said if the child lived long enough that would decide the diagnosis; if the child lived, it did not have tuberculous meningitis.

DR. CHAPIN said that in tuberculous meningitis one frequently did not get a positive von Pirquet reaction.

DR. SMITH said he wondered if some of the cases diagnosed as tuberculous meningitis in the past might not have been this disease.

DR. OSCAR M. SCHLOSS said he did not know a definite way of differentiating encephalitis from tuberculous meningitis in the early stages, but that disease was more chronic than tuberculous meningitis. The cases all ran a long course and often showed some form of paralysis or paresis. Two out of 3 showed some paresis on one side of the face, not enough to be called a paralysis. The thing that was striking was that they slept all the time; they went on that way for weeks and months, which was not true of tuberculous meningitis. The spinal fluid changes might be almost the same except that the count was apt to be lower in encephalitis. In some cases, however, there is no increase in the count at all.

DR. BARTLEY said that in the cases of encephalitis lethargica that he had seen there was not the irregularity in respiration and pulse that one sees in tuberculous meningitis. In tuberculous meningitis there were pressure symptoms which were absent in these cases. The cases of encephalitis lethargica went along without change in about the same way, while tuberculous meningitis progressed from day to day. Perhaps it was not always so,

but in the cases he had seen there were no symptoms of intracranial pressure and no strabismus such as were almost always seen, sooner or later, in tuberculous meningitis. Paresis might be present in both conditions, so it seemed to him that the significant thing was the pressure symptoms. In tuberculous meningitis the time from the onset of symptoms until death was on an average 14 days.

DR. SMITH said it seemed to him then that the great difference between encephalitis lethargica and tuberculous meningitis was the failure to progress. If one watched a case for 3 days and there was no change in the condition it was more likely to be one of encephalitis lethargica. The average length of life after coma set in was about 5 days; a coma lasting 10 days was very long in a case of tuberculous meningitis.

A member stated that in regard to the catatonic phase there was something characteristic in the cases they had seen at Bellevue. The catatonia usually appeared within 5 days after the onset of symptoms. In encephalitis lethargica there was not so much a paralysis as a weakening of the facial nerve so that the face and jaw assumed a wax-like appearance. This and the characteristic catatonia were the 2 signs that differentiated the condition so far as he had noticed.

DR. SMITH said he had seen 7 cases of encephalitis lethargica and they all had catatonia. If one put the hands of the child in a certain position they remained in that position for a long time; that feature had been very interesting and striking.

TUBERCULOUS ARTHRITIS.

DR. FRANK J. BEVAN presented this case, a female child, 13 months old, brought to the Babies' Hospital because of swelling of the left knee. The swelling was noticed 6 weeks before this time and had been increasing. There was a discharge from the left ear for 1 week. The family history was interesting in that there was no other pregnancy, no miscarriages, and no exposure to tuberculosis. The feeding history was normal. The child had had nothing but a soft diet and had never been sick before. Six months ago the child had begun to walk and was able to take a step or two, but gradually became less inclined to try to walk and after about 3 weeks would not try to walk at all. The swelling of the knee had increased and when the knee was

handled the child always cried out. She had never had fever or night sweats, and had had no vaginal discharge. One week ago the ear broke. This was not preceded by fever. The discharge was very foul.

The child was seen for the first time in the outpatient department of the hospital. She gave a positive von Pirquet reaction and the physician who saw the case a week before considered it one of scurvy and had given the child orange juice. The tonsils were enlarged but otherwise negative, and the cervical lymph nodes were enlarged. The lungs, heart and abdomen were negative. One could barely feel the spleen, the liver was not enlarged and there was no mass suggestive of adenitis in the abdomen. The left knee was enlarged and the left hip, though not enlarged, was rather tender. There was a typical chronic dactylitis. The case was interesting because the baby was only 13 months old and showed a typical tuberculous arthritis.

Discussion—DR. SCHLOSS asked if the otitis media was a tuberculous one.

DR. BEVAN said they had not yet worked out the bacteriology as regarded the tuberculosis. The pus from the ear had a very foul smell.

DR. SCHLOSS said the reason he asked whether the otitis media was tuberculous was because tuberculous otitis media was not uncommon. He had seen 3 children under 3 months of age with tuberculous otitis media in whom a radical mastoid operation was done. Two of these children had recovered and were perfectly well; he did not know about the third.

DR. SMITH stated that he had seen 3 cases of tuberculous otitis media in 1 ward in a maternity hospital, and all had developed within 3 months. They were all submitted to radical mastoid operations.

MYOSITIS OSSIFICANS.

DR. MINER C. HILL presented this patient, a boy about 12 years of age. He had been nursed for 9 months, had had measles, whooping-cough and mumps, and at 2½ years of age swelling on one side of the neck. This swelling had persisted and became progressively harder. Following this, the muscles of the back began to show areas of ossification and also those of the arms and legs, until at the present time the boy presented many de-

formities, and furnished a striking example of the condition known as myositis ossificans.

Discussion—DR. GAYLORD W. GRAVES said that this was a boy with whose history he was familiar to a certain extent, as the boy had come to his office about 5 years ago, referred by another physician. At that time no such complete changes were to be observed. There was, however, a very noticeable lesion extending along the posterior surface of the right chest, which resembled periostitis of the ribs; and although the examiner was not familiar at that time with "myositis ossificans," mention by the boy's mother that a doctor at Bellevue had told her the boy's muscles were turning to bone had recalled the term to mind and had led to the correct diagnosis.

The boy later came to Roosevelt Dispensary, where his history was looked up and it was found that at Bellevue Hospital a study of the tissue pathologically and also an investigation of the patient's calcium metabolism had been made. X-ray pictures, taken at Roosevelt Hospital, if compared with those taken at the present time, would show the progressive course of the disease. These Roosevelt radiographs had been turned over to the Bellevue investigator to facilitate completion of his report of the case but it was uncertain whether this report had been finally published.

The case thus had a long history and was interesting because there were only 100 to 125 such cases on record and also because it emphasized that when one saw this condition a second time he might be observing the same case he had seen before.

MASSIVE CONGENITAL DIAPHRAGMATIC HERNIA WITH DEXTRO-CARDIA.

DR. H. W. MAYES reported this case and presented the specimen. He stated that the infant was born spontaneously in April 20, 1919, and was apparently normal. In a short time, the child became dark blue and remained so until death, which resulted apparently from pulmonary edema 7 hours after birth. Judging from the cyanosis the child was considered a blue baby but no murmur was detected over the precordium. At autopsy the external appearance was that of a normal child except for bluish discoloration of the skin. On opening the chest and abdomen, the left thoracic cavity was filled with the stomach, spleen, pan-

creas, one-half of the left kidney, part of the duodenum, ileum, and greater part of the colon. These organs were free in the pleural cavity with the exception of the kidney. A very small rudimentary left lung, showing division into 2 lobes was found in the upper part of the thorax. The heart was completely on the right side. Between the auricles was a small patent foramen ovale. The pulmonary artery was almost as large as the aorta and, lying almost in front of it, was continuous with the ductus arteriosus, which was also patent. The right lung was made up of 3 lobes and had a large depression filled by the heart. The thymus was normal. The abdominal cavity contained a large liver, which extended down to the brim of the pelvis, a right kidney normal in size and position, one-half of the left kidney, and the sigmoid, which extended in a straight line from the rectum to opening in the diaphragm. The right side of the diaphragm was normal. The left side showed good muscular tissue, normal attachments anteriorly and laterally, but no attachment to the posterior chest. This left an opening 2 x 5 cm. in size through which passed the cardiac end of the stomach, a loop of the duodenum, the colon, and the left kidney, making a false diaphragmatic hernia. The kidney was retroperitoneal and formed the posterior boundary of the opening. Dr. Mayes stated that the hernia in this specimen was undoubtedly formed during the early life of the fetus or they would not have the rudimentary lung on the left side. The dextrocardia was secondary to the hernia. The patent foramen ovale and the ductus arteriosus were due to the fact that the heart was out of its normal position.

Dr. Mayes, in discussing diaphragmatic hernia, stated that the condition was rather common and that the true diaphragmatic herniae were more frequent than the false. They occurred more frequently on the left side because the liver was on the right side. Most of the patients died before the correct diagnosis was made. Some were operated on successfully. After referring to the literature on this subject, Dr. Mayes expressed the opinion that judging from the cases reported by Gross and Morgan, as well as his own, the dextrocardia must have some influence in causing the patency of the foramen ovale and the ductus arteriosus.

A CASE OF BACTERIEMIA TREATED BY BLOOD TRANSFUSION.

DR. JESSE F. SAMMIS reported this case (to be published in a later number of *ARCHIVES*).

TRUE CONGENITAL DIAPHRAGMATIC HERNIA.

DR. HENRY R. MULLER reported this case which came under observation at the Nursery and Child's Hospital. He stated that the child was a white male, 8 months old, who weighed on admission to the hospital 11 pounds, 6 ounces. The child's weight at birth was $7\frac{1}{2}$ pounds. Vomiting, described as projectile, and taking place immediately after the ingestion of food, had occurred since birth.

At the age of 6 months and while still on breast feedings, he improved somewhat and gained 3 pounds, 2 ounces in weight; that is, he increased in weight from 11 pounds, 3 ounces, to 14 pounds, 5 ounces.

Three weeks before admission to the hospital, at about the age of 7 months, he began to vomit all his feedings, even water. Up to this time he had been entirely breast fed, but he was now put on mixed feedings, consisting of 3 breast and 4 bottle feedings a day, with irregular additions of zwieback. For a day or 2 his vomiting stopped, but it recurred and his condition since then had grown gradually worse. For the past 4 days the child had been drowsy and lost, during that time, 3 pounds, 5 ounces in weight. There had been no convulsions, but the child had been coughing and sneezing, and this was followed by vomiting.

Physical examination showed a fairly well developed but undernourished child. His eyes were sunken and he appeared acutely ill. His respirations were deep and sighing and he was semi-comatose. The lips were dry and cracked, the tongue coated, and the mucous membranes of the mouth dry. There was no evidence of cerebral irritation. Examination of the heart showed the beat in the fourth interspace in the left middle line. The abdomen was scaphoid and symmetrical. The skin wrinkled and inelastic. No tumor mass was palpable nor were peristaltic waves observed. The liver and spleen were not felt and there was no fullness in the epigastrium.

In the admitting room, the child was given 3 ounces of water, which was taken greedily, but vomited at once with a great gush. The entire mass of water seemed to reach the mouth at one time; the vomiting was not projectile. In the ward the same type of vomiting was observed on attempting to feed the child milk. He could retain only 2 ounces of albumin water every hour. When an attempt was made to increase the quantity, vomiting

recurred at once. Intraperitoneal saline injections in large amounts were administered, and glucose solution was given intravenously.

The blood examination showed 13,000 leucocytes, of which 52 per cent. were polymorphonuclears. Examination of the spinal fluid and the von Pirquet test were negative. A slight trace of albumen, and marked traces of acetone and diacetic acid were present in the urine.

On admission, the temperature of the child was 99°F. The child died of coma 48 hours after admission; the temperature just before death reaching 106°F.

Briefly, what was found at autopsy was a diaphragmatic hernial sac, 5 cm. in diameter, situated in the thorax posteriorly and to the right of the heart. The outer surface was covered with a layer of parietal pleura, and the inner surface was covered with a layer of parietal pleura, and the inner surface was lined with peritoneum. The neck of the sac, corresponding in position with the normal esophageal opening of the diaphragm was circular and 2 cm. in diameter. The muscular layer of the diaphragm could be distinguished up to the neck of the sac, and ended there abruptly. There were no muscle fibres in the wall of the sac, but only connective tissue. This hernial sac contained the entire stomach, doubled up and collapsed, and the omentum. There were no adhesions present. The esophagus, markedly dilated, had its new covering in the upper left hand corner of the sac, where it emptied into the stomach. The condition then was that of a true congenital diaphragmatic hernia through the esophageal opening. Such hernias were generally considered to be formed late in embryonic development, after the closure of the transverse septum.

Discussion—DR. SCHLOSS said that this case which Dr. Muller had reported was particularly interesting clinically. The child was seen on account of persistent vomiting which was the prominent symptom. During the comparatively short period that the child was receiving solid food it gained 3½ pounds. The diagnosis of pyloric stenosis had been considered but was eliminated. As frequently happened in this condition, the diagnosis was not made. The case furnished a strong argument for the use of the fluoroscope in all vomiting babies. By that means the diagnosis would be made in many more of these cases.

BOOK REVIEW

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY. A new and complete dictionary of the terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Nursing, Veterinary Science, Biology, Medical Biography, etc., with the Pronunciation, Derivation, and Definition, including much collateral information of an encyclopedic character. By W. A. NEWMAN DORLAND, A.M., M.D., F.A.C.S. Member of the committee on nomenclature and classification of diseases of the American Medical Association; Editor of "American Pocket Medical Dictionary." Together with new and elaborate tables of arteries, muscles, nerves, veins, etc.; of bacilli, bacteria, diplococci, micrococci, streptococci, ptomaines and leukomains, weights and measures, eponymic tables of diseases, operations, signs and symptoms, stains, tests, methods of treatment, etc. Tenth Edition, revised and enlarged. Philadelphia and London. W. B. Saunders Company, 1920.

The tenth edition of this dictionary, which was first placed before the medical profession exactly 20 years ago, has been thoroughly revised and amplified. Several hundred new terms have been added and defined, and the general plan of the previous editions has been maintained. Little need be said in regard to the volume itself. It has in its maturity reached the stage of becoming a classic. Although a dictionary proper, yet it is almost encyclopedic in character and may to advantage be used for reference in a great many conditions. It is a highly convenient desk size in spite of its 1201 pages. For the man who wants the precise meaning of both old and new terms, it is absolutely invaluable.

JUVENILE DIABETES (New York Medical Journal, Aug. 30, 1919). Of the 3 cases reported by P. Horowitz the oldest patient was only 3 years of age, and the youngest slightly more than 2 years old. The cases show the value of institutional over home treatment. Two patients were treated in the hospital and improved very much more rapidly than did the patient who was treated at home. In each case there was a definite history of an intestinal toxemia preceding the onset of the disease.—*Journal A. M. A.*

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS

ACRODYNIA.*

By WILLIAM WESTON, M.D.

Columbia, S. C.

This paper is based on a series of 8 cases in the practice of Dr. W. F. Patrick of Portland, Oregon, who has very kindly permitted me to use them. Dr. Patrick referred these case reports to Dr. John Lovett Morse of Boston for diagnosis and advice, and Dr. Morse in turn referred them to me, feeling that there was a definite suggestion of pellagra in each one. I agree with Dr. Morse that there is a suggestion of pellagra, but I felt that a diagnosis of pellagra would not be justified for reasons that will be given later.

* Read before the Section on Diseases of Children, A.M.A., held at New Orleans, April 28, 29 and 30, 1920.

Before writing to Dr. Morse, I consulted Dr. Babcock of Columbia, S. C., who is probably the foremost authority in this country on pellagra. Dr. Babcock has given as his definite opinion that these cases are not pellagra, and suggested that I look up an article by Dr. Henry Strachn of Kingston, Jamaica, in which he reported a number of cases which he described as "malarial multiple peripheral neuritis." Both Sir Patrick Manson and Dr. F. M. Sandwith of London disagreed with the diagnosis made by Dr. Strachn. Dr. Sandwith, in his effort to arrive at a diagnosis, considered pellagra, beri beri and malarial neuritis, and each was eliminated, and he finally suggested that the cases might be acrodynia. After a diligent search of the literature both Dr. Babcock and I feel that the cases reported by Dr. Strachn and those reported by Dr. Patrick are most suggestive of acrodynia, and the purpose of this paper is to suggest to the profession that they be on the lookout for this disease and record similar cases that may occur in their practice in order that we may study the disease with the advantage of additional light which may enable us to arrive at a more definite conclusion.

Dr. Patrick's letter to Dr. Morse is as follows: "During the last 9 months we have had a series of cases, 8 in all, ranging from nine months to 2 years, with one bigger boy of 5 years, all of which seem to belong to the same general class.

"They begin with loss of appetite, get listless; some have infections of the upper respiratory tract, some do not; some have intestinal symptoms, some do not; but all have loss of appetite, lose weight and have diminished reflexes at times (probably following increased reflexes earlier). Some have absent knee jerks for weeks. They all want to lie around, very listless. All have profuse perspiration all over their body with scratching and more or less maceration of skin. In every case the hands and feet have been cold, bluish red and swollen, tender, and about half painful to touch. One had photophobia and red conjunctivae, the same one having a small area of necrosis about 2 erupting teeth. Two have had necrosis of the gums and alveolar processes in both upper and lower jaws, losing in one case 6 teeth and in the other 8 teeth, with accompanying salivation and stench. All have lost a great deal of weight and with but 2 exceptions have been too sick to treat as office patients. They are

very listless and don't want to be handled. They have all gotten well except 2 that are being seen now.

"The big boy began to improve coincident with adopting a diet of vegetables, cereals, etc., excluding all meat, eggs, fish and milk (he was never as bad as the others). Of the remainder I cannot feel that anything we have done has been of any use. One began to improve coincident with tincture of *nux vomica*, one minim, t.i.d.

"In a general way they have all been kept on a rather well balanced diet. They came from widely scattered sections of Oregon, only 2 from Portland.

"They have all been negative to the von Pirquet reaction and 3, whose history might be regarded with some concern, were negative to the Wassermann reaction. We have consulted skin men and nothing worth while has been offered by way of treatment. Urines of course were looked after and all were negative. We can find nothing in the literature about it. They seem to get well after awhile all by themselves. They are miserable cases to deal with and most pitiable to behold.

"None of them have ever had a temperature of more than 102°. They have all had head colds, some not at all well marked. All have sweated profusely. All had swollen, cold, bluish-red feet and hands. Knee jerks have been sluggish or absent in all at some time, returning to normal as the child approaches normal. All have had extensive involvement of the skin of the body, scratching, listless but sleepless. I am writing hoping that you can tell me about them and what to do for them. I am sending copy of office notes on one case that I "treated" as an office patient. In his case the lesions of gums were not more marked than I have seen many times in erupting teeth.

"Case history: March, 1919. Child's name, Richard; date of birth, June 2, 1918. Family history negative. No deaths and no miscarriages. No history of T. B. No asthma, and no eczema. Full term, normal pregnancy, normal delivery. Weight at birth 9½ pounds. Breast fed for 4½ months, then on cow's milk mixture with barley water and cane sugar. Food increased from time to time. Grew and did well. Sat alone at sixth month, first tooth at seventh month and was beginning to stand by chair at eighth month. At about this time began to have 'bronchitis' and has not been well since. One week later, began

to have rash on body, and in another week rash was quite marked. Hands and feet became cold and clammy and soon turned red and became swollen and tender. He scratched continuously, and cried, acting as though his hands hurt. An intestinal upset about this time occurred, with 6 to 8 offensive stools daily for 2 days. Then continued to have small, frequent bowel movements of good consistency. Came in aged 9 months, weight 22½ pounds, temperature 97°. Had probably lost 2 pounds during the previous month, and was droopy. Paid little attention to anything except his scratching. Did not try to creep or stand. Was taking 1 quart of skimmed milk, orange juice, prune juice and cereals.

"Physical examination. A very distressed baby boy. His underclothes were wet with sweat. Hands and feet swollen, bluish-red, with fingers held apart and guarded. They showed a macerated skin covered with ruptured vesicles. His face and trunk were pale but covered with macerated skin. He cried constantly. Nasal discharge—throat moderately injected. Mucous membrane of mouth showed some redness. Teeth, 4 upper, 2 lower with no special reaction in the surrounding gums. Ears showed dull reflex, neck limber. Lungs clear throughout. Heart normal. Abdomen level with chest, no tenderness or masses. Neither liver nor spleen palpable.

"Reflexes—knee jerks hard to obtain. Cremasteric not present though scrotum was relaxed. No Kernig. No general glandular enlargement. Temperature 97°, pulse 100. W.B.C. 18,000. Specimen of urine could not be obtained. Tentative diagnosis was made of nasopharyngitis.

"He was given atropine, 1/500 q. 4 h. until face began to flush. Corn starch, drachms 2; sod. bicarb., drachm I; zinc oxide ointment and petroleum āā oz. I, applied to skin. Camphor, iodine, menthol āā gr. ¼, albolene, drachm I, 4 times a day for nose.

"March 18, 1919. Weight 22½ pounds. Temperature 98°. For 2 days was much better. Then mother omitted atropine as face became flushed. Slept well 2 nights, and was not sweating so much. Feet less painful, also hands. Three days ago (also third day after last visit) eyes got sensitive to light and were quite red. Condition of hands and feet about the same as at first visit. He does not take his food as well. Advise continuing

atropine gr. 1/500. Alternating 10 per cent. argyrol with nose drops.

"March 21, 1919. Weight 23 pounds. Temperature 98°. Was greatly improved until yesterday morning, when he broke out with rash again and is now scratching almost as much as at first. Eyes very sensitive to light. He is drooling extensively, and around 2 erupting teeth are small areas of necrosed gum. Hands and feet red, tender, and swollen. He cried all last night, slept none at all except *when mother was rubbing his hands*. Advise continuing nose mixture and atropine, potassium chlorate mouth wash 4 times a day. Codeine sulphate gr. 1, water 1 oz. 10 drops (1/50) every 4 hours.

"March 29, 1919. Weight 21 pounds, 15 ounces. Temperature 100°. Necrotic area around teeth slightly larger; gums red and swollen. Does not sweat so much. Hands and feet are not so swollen. He sleeps better. He scratches more than last week. Advise omitting codeine, otherwise same.

"April 4, 1919. Temperature 99°. Weight 21 pounds, 11 ounces. Seems better in every way. Hands and feet somewhat better than last visit. Mouth better. Eyes remain sensitive. Lungs, heart, abdomen, joints normal. He is droopy and wants to be held all the time.

"April 8, 1919. Weight 22 pounds, 1 ounce. Temperature 98°. Distinctly improved. Skin and body are dry. Hands and feet slightly reddened. Notices more. Mouth shows some improvement.

"April 16, 1919. Hands and feet warm and dry. Body moist, but much better. Eyes better. Hands and feet not painful. Sleeps well.

"May 12, 1919. Weight 21 pounds, 1 ounce. Temperature 98°. Sweating less all the time. Eyes are better, much brighter. Takes his milk well but declines cereals and toast, and will not take carrots and spinach. Two bowel movements daily. Sleeps well. Medicine gradually reduced since last time, not taking any atropine now. Hands and feet a bit clammy; some rash on body, scratching some. Superficial glandular enlargement not axillary, inguinal, occipital or epitrochlear. Gums healed about teeth. W. B. C. 18,000. Advise malt, cod liver oil, phosphorus, teaspoonful t.i.d.

"June 9, 1919. Weight 21 pounds, 15 ounces. Has been pick-

ing up, doing fine, appetite good. Bowels constipated. Sleeps well, scratches sometimes, hands and feet do not hurt, eyes sensitive to light. Now taking 1 quart of milk, crackers, toast, spinach, carrots, meat juice, orange juice, cream of wheat, etc. Superficial glands about same. No liver, no spleen.

"July 25, 1919. Weight 23 pounds, 7 ounces. Temperature 98.6°. Has been walking last 2 weeks. Eats well, sleeps well. Hands and feet seem normal now.

"October 5, 1919. Age 16 months. Weight 27 pounds, 7 ounces. Temperature 98.6. Has had a cold last 10 days. Not much fever, if any. Both ears have been discharging for the last 2 days. Has been fine up to 10 days ago. Eating everything, looking fine, eyes normal. No rash, no sweating, hands and feet O. K. Both ears discharging; nasal discharge. Lungs, heart, and abdomen O. K. No glandular enlargement. Looks fine again. Advise irrigation of ears twice daily, nose mixture."

What knowledge we possess of acrodynia is derived chiefly from the accounts of the Paris epidemic, which was first observed in June, 1828, and lasted until the middle of the winter of 1829-1830. A number of authors state that this was the first epidemic of this disease to occur in France. Previous to the discovery of acrodynia in France, several German writers, notably Schwenkfeld, Wolf, F. Hoffman, and Muller described, under various names, *krampsucht*, *kornstaupe*, *kriebelkrankheit*, *morbus cerealis*, *morbus spasmodicus malignus*, *epidemicus malignus*, etc., an epidemic convulsive disease, the descriptions resembling almost identically the Paris epidemic as described by Dance, Chomel, Cayol, P. Montault, Valliex, and others. Therefore we feel reasonably sure that while the German authors felt that they were describing an unusual and peculiar form of pellagra, in the light of subsequent study we are justified in feeling that the disease was acrodynia.

In 1837 Dr. Pingault, in an address before the Society of Medicine of Poitiers, reported several cases of "podalgia." The symptoms which he described as manifested by these patients are almost identical with those of many of the cases reported in the Paris epidemic.

Montault, writing about 1829 or 1830, quotes Francois as having recognized the same disease (Paris epidemic) in the

West Indies among the negroes, who lived in houses in low and damp places.

There is an article in "The Indian Gazette" of August 2, 1880, by Surgeon-Major B. Evers describing a disease in which the chief manifestation is intense burning of the feet. He calls it "ignipedites" and says this disease is quite common in India.

Dr. W. J. Cole, of Blairsville, Indiana, published in the St. Louis (Mo.) Medical and Surgical Journal of April 5, 1880, 3 cases of intense burning of the hands as having occurred in his practice during the last 3 years. Having read the reports of the Paris epidemic, he pronounced them acrodynia. His report is very brief. He speaks of using tobacco poultices, morphia, etc., but concludes that the trouble was self limited as they recovered in due time.

In 1888, Dr. Henry Strachn, senior medical officer, reported 510 cases of "malarial multiple neuritis" observed in the Kingston (Jamaica) Public Hospital, full notes having been taken on 121 of these cases. The patients complained of numbness and burning heat in the palms and soles, often accompanied by cramps, worse at night and in wet weather. Impaired vision and hearing were noted, and a feeling of constriction around the lower part of the chest. An eczematous condition appeared on the tops of the eyelids, the angles of the mouth, and the mucocutaneous margins of the nostrils, the lips were usually red and the palms hot to the touch and hyperemic. Later, motor pains of the upper and lower extremities occurred. Pain was constant, especially in the feet. Emaciation developed with the progress of the disease. Pigmentation of the palms, soles and lips appeared; respiration is impaired and death may ensue from paralysis of the respiratory muscles. Death is rare, recovery being the rule.

The subjective symptoms are dimness of vision, impaired hearing, numbness and cramps of the extremities, girdle pains, joint pains, etc. The objective symptoms include trophic changes, monoplegias, altered gait, knee jerk was absent in over one-half, exaggerated or subnormal in 23 per cent., normal in rest, cutaneous reflexes varied greatly, sensations were blunted or impaired, soreness of the mucocutaneous line of junction, wasting of the muscles. Soreness of the mucocutaneous borders, i. e. eyelids, lips, etc., was almost the first symptom. Wasting and contraction

of the muscles was very marked in extreme cases, the "claw" hand and foot being prominent features. The ophthalmoscope revealed some retinal hyperemia rarely amounting to optic neuritis, but pigmentation of the fundus was observed. Pigmentation of the brain and cord was the only feature observed post-mortem. (Pellagra by Marie).

Dr. F. M. Sandwith of London in a letter to Dr. J. W. Babcock makes these interesting comments on Dr. Strachn's cases: "It is impossible to tell what disease Strachn is describing; certainly not pellagra or beri beri or malarial neuritis. Is it possible that his disease is post dysenteric neuritis, of which there is a good deal in the West Indies? The points against pellagra are: multiple neuritis, numbness and cramps in the hands and feet, dimness of sight, tightness around waist, burning in palms and soles, tenderness over ulnar nerve, patient kept awake at night rubbing feet and legs, atrophy of muscles producing claw hand, facial palsy, deafness, scotoma, patients mostly get well, desquamation of palms and soles, skin eruption confined to mucocutaneous orifices, palms and soles. Acrodynia might also be considered. (Pellagra by Marie.) Sir Patrick Manson does not agree with Strachn's diagnosis either, but does not suggest one."

Practically all the observers who have written accounts of the Paris epidemic lay stress on the fact that cases coming from different localities or even from different sections of Paris presented somewhat different symptoms, and it was a common observation that in certain barracks a particular manifestation might be very pronounced in all the cases there, while the same symptom might be altogether absent in another barrack where the disease prevailed with equal severity. This observation is especially applicable to the extent and character of the skin manifestations.

Generally speaking, the first symptoms noticed were numbness, tingling and itching of the hands and feet. Montault observes that all the patients he saw had pains of a lancinating nature and so intense a burning that they wished to immerse their feet in cold water. Often these sensations were confined to the soles and hands, but this was by no means a constant observation.

Other writers observe that many of the Paris cases suffered from an insupportable tingling which they compare to the sensation one experiences in the hand on compressing the ulnar nerve.

Vallieux writes: "Alteration of feeling and touch were also

observed. Some patients could not touch the softest body without feeling a painful sensation as if they were touching something rough; others when walking on a hard surface felt that they were walking on something soft. In many of the cases complete paralysis of sensation were lost in the hands and feet for a time."

The same author states that severe cramps were usual, while in others mere muscular twitchings or muscle spasm was observed. The consensus of opinion among these observers was that the pains were greater at night and in wet weather.

Another interesting observation to which Valliex calls attention is that the different alterations of motility, such as contraction, cramps, paralysis, were far from manifesting themselves separately. On the contrary, he says, they often succeed one another in the same patient.

Prof. August Hirsch, who has the advantage of a most extensive bibliography, in discussing the symptoms makes this interesting statement: "In cases of a severe type, paroxysmal seizures of cramp, or evidences of paresis of the extremities, will occur in the subsequent process; the limbs are kept continually bent in a state of tonic spasm, or there is an inability to grasp or hold objects or to walk straight. If these nervous attacks should have persisted for sometime, the affected limbs waste, and there occurs edema of the thighs and legs, and sometimes even general anasarca." Great irritability and obstinate insomnia were present in most of the cases. Wasting of the muscles of the hands and feet was not unusual. Erythema of the hands and feet was sometimes confined to the palmar and plantar surfaces; in other cases the erythema was confined only to the lower extremities.

These lesions were sometimes vesicular, sometimes papular, in others pustular; finally there was a desquamation of more or less long duration and which renewed itself more or less frequently. Sometimes these lesions appeared in different parts of the body. Chomel mentions a case in which the entire epidermis of the breast became detached.

There was marked discoloration of the affected parts, usually the surface was red, at other times there was a distinct brownish or black discoloration of the skin. There was irritation and discoloration of mucus surfaces. Local sweats of the extremities was the rule, however, general sweats were often observed.

Redness of the conjunctivae with lachrimation and sensitiveness to light were often observed. Sometimes a pricking sensation was felt about the eyes, at other times there existed a sensation as if a foreign body was in the eyes, again there was a sensation about the eyes that was described by the patients as the same as was felt in the hands and feet. Local or general edema was usual. Often this swelling was confined to the extremities. There was no pitting upon pressure.

The digestive symptoms varied from a simple loss of appetite and epigastric discomfort to nausea, vomiting, diarrhea with bloody stools. In other patients, constipation was the rule. There was usually a slight temperature; in some cases none, but in cases where the digestive symptoms became very severe the temperature became high.

Etiology.—Like pellagra the predominance of opinion seems to be that acrodynia is a food deficiency disease, yet this hypothesis is difficult to reconcile with the history of the epidemics. We have seen that during the Paris epidemic certain barracks were entirely free from the disease, while others, the rations being the same in kind and variety in all, the crowding and hygienic conditions the same, were filled with patients suffering from this disease. To such an extent was this true that several barracks had to be evacuated.

Treatment.—The disease is self-limited, therefore treatment should be directed towards making the patient comfortable and sustaining his strength by giving a well balanced diet.

Calamine lotion is recommended to allay the intense irritation of the hands and feet. If the sweating is very severe, use small doses of atropine. In some cases, where insomnia is very obstinate and cannot be controlled by hydrotherapy, small doses of morphia will have to be given.

I wish to acknowledge my thanks to Mr. Martin of the Surgeon General's Library, to Mr. Samuel Harper, and especially to Dr. J. W. Babcock for many helpful suggestions and the generous use of his library.

A CLINICAL CLASSIFICATION OF THE DIARRHEAS OF INFANCY AND CHILDHOOD.

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The one time attitude of the medical profession, as well as the laity, toward the diarrheas of infancy and childhood furnishes one of the most striking examples of superstition and fatalism in the history of medicine, since they have been accepted without question as necessary accompaniments of the second summer and teething. There is nothing especially new or original in the classification here presented as a whole, but it is used in order that we may better appreciate the proper relation which exists between the simple, or digestive types and the infectious group, the clinical manifestation of which, as seen on the Middle Atlantic Coast, I wish to emphasize.

Diarrheas of the simple digestive or non-infectious type may occur in either nursing infants, or those artificially fed; in very young infants, or in children of several years of age. They may come on gradually or suddenly, end as abruptly as they appeared, or drag on to a state of marked chronicity.

For convenience the diarrheas of early life may be classified as follows:

(A) Nervous Diarrhea

1. Sudden overheating.
2. Sudden chilling.
3. Excitement or fear.
4. Improper or indigestible food.

(B) Food Injury (acute)

1. Overloading the digestive tract, particularly the stomach, with proper food.
2. The accidental administration of an excess of one or more food elements in a bottle baby's formula (fat, carbohydrate or proteid).

(C) Food Injury (chronic)

1. The habitual administration of too large quantities of one of the normal and proper food elements.
2. Mixtures too strong in all elements.

(D) Fermental Diarrhea

(E) Infectious Diarrhea due to:

1. the dysentery group of organisms,
2. the gas bacillus,
3. other organisms. (Clinically, group E may be divided into 4 types—to be described later.)

Nervous Diarrhea. 1 and 2, sudden changes in temperature, whether of heat or cold, by acting on the sympathetic nervous system often cause an increase in peristalsis, thus producing an increased number of more or less normal stools. If the peristaltic movement is sufficiently prolonged, there may be an irritation of the lining mucous membrane of the intestines to an extent sufficient to produce a watery discharge, or even the appearance of mucus in the stools. Also, because of the extension of the peristaltic wave to the duodenum, the gall bladder may be emptied, the bile, which is a powerful cathartic, causing excessive purgation. A reversal of the peristaltic wave, by reaching the stomach, may produce vomiting also. This may in turn extend to the duodenum, in which case the bile is vomited instead of passing downward. Too long exposure to extremes of temperature, rather than abrupt changes, may produce the same results. Such instances are a child being allowed to play for too long a time in the hot sunshine, or an infant being chilled on an automobile ride. Cold feet in infancy are a potent influence in the production of colic, which is often a modification of the above condition.

3. Excitement, either through too violent play, or too much rocking, jumping or other handling will produce the same effect. This is often the cause of intractable colic and "indigestion" with pain. Fear is a too well recognized cause of diarrhea to call for discussion. Generally these conditions are not accompanied by fever.

4. Whether or not "improper food," i.e. articles generally recognized as "indigestible," cause digestive disturbances, vomiting and diarrhea, is a disputed point by authorities. In a number of cases, however, the eating of certain articles of food, with their subsequent appearance in the vomitus or bowel discharges, certainly lends weight to the positive side of the argument. This class may be accompanied by moderate or even severe fever.

Food Injuries (acute). 1. As a rule this type of diarrhea occurs in older children who have been allowed to over-eat, especially at a party. Vomiting is more apt to occur than is

diarrhea, but both are often associated, but not infrequently diarrhea occurs alone. There may be an absence of fever or a sharp elevation. Convulsions may occur. In this type, the character of the food may be quite correct, the injury occurring merely as a result of an unbalance between the normal digestive power and the strain put upon it.

2. This type occurs with a bottle baby when a mistake has been made in the proportion of the elements which make up the formula. Such mistakes may be made by the physician in writing his directions, or by the attendant who compounds the formula. Any of the principal elements—fat, carbohydrate or proteid—may be at fault. This diarrhea may be accompanied by vomiting.

Food Injuries (chronic). It must be remembered that an infant which has an apparent or actual inherent intolerance for one of the food elements, or, which acquires an intolerance for one of the food elements, will eventually acquire an intolerance for all others, if the elemental proportion is not regulated in time.

1. By giving an infant an amount of any one of the main food elements—fat, sugar or proteid—in excess of its capacity for that element, over a prolonged period, a diarrhea which may be intractable is often established. There may be vomiting without diarrhea, or accompanying the diarrhea, but most often a diarrhea alone is established. The character of the discharge depends on the element in excess.

2. A generally too strong mixture of milk, beyond the normal requirements of age and weight, over even a short period of time, is a frequent cause of diarrhea.

Fermental Diarrhea. A sharply defined distinction, between diarrhea from "simple indigestion," fermental diarrhea, and infectious diarrhea, is often difficult to make, because the activity of the so-called normal intestinal flora may become so altered by various influences as to act in almost any manner common to bacterial growth, and yet clinically fermental diarrhea is a more or less definite entity. The saprophytic bacteria are the ones commonly active in this type of diarrhea. The characteristics are watery, greenish, yellow stools, irritating to the skin, caused by fermentation of either carbohydrate or fat. Curds are usually absent, but mucus is quite common.

Infectious Diarrhea (enterocolitis—ileocolitis.) Under this caption is generally included a group of intestinal disturbances

manifested by diarrhea and other symptoms, which have for a long time been variously designated as "summer diarrhea," "summer complaint," "cholera infantum" and the like. With a fatalistic resignation they have been accepted as a natural incidence of teething, second summer, catching cold on measles and almost numberless other conditions. More recent investigations have served to prove that they are of infectious origin, and are caused by 3 main groups of microorganisms:

1. The dysentery group.
2. The gas bacillus.
3. Other organisms.

The clinical manifestations are practically the same for all 3 groups. The dietary treatment, at least, differs materially. That for 1 and 3 is the same. That for 2 quite the opposite. I have never seen group 2 in the vicinity of Norfolk, Va., until the present summer.

Infectious diarrhea or ileocolitis is usually seen during the summer months, hence its name "summer diarrhea." This however is not the only time of its appearance. It may occur as an accompaniment or sequel of measles, influenza or any other disease of proved or assumed bacterial origin. It is rare in the nursing infant. There are 4 more or less distinct clinical types seen on the Middle Atlantic Coast.

Type 1. This remarkable type differs so radically from our usual conception of diarrhea as to merit special consideration. The children are taken suddenly and violently ill. Very high temperature is the rule, and marked prostration often within an hour. They make us think of the "heat stroke" theory of Meinert. The skin is hot and flushed, but followed very rapidly by a cold, clammy perspiration. During this stage, these patients are *obstinately constipated*, an initial purgative rarely producing evacuation. An enema is necessary at once, and this empties the lower bowel. This is often difficult of accomplishment, giving one the impression of an impaction with a hard bolus. When the lower bowel is emptied the initial movement is immediately followed by mucus, pus and blood. All of this may result in the course of a very few hours. Vomiting is the exception, but may be violent. I have never seen this type except during a spell of exceedingly hot weather. The majority of these cases die in 1 to 3 days, only the mildest cases surviving. The temperature may drop

rapidly to subnormal or, if the end comes quickly, may remain elevated to the time of death.

I am unable to account for this symptomatology. The few autopsies I have performed show the same pathology as that of typical ileocolitis. The changes could hardly take place in the short time between the first symptom and the appearance of blood, mucus and pus in the stool; and yet these pathologic changes were present even in a case which died within a few hours of the onset of the disease. Whether or not such changes take place before the apparent onset and cause no symptoms, I am not able to say.

Type 2. In this type the onset is gradual, with loose yellow stools which increase in frequency until 48 to 72 hours, when mucus appears. The yellow color slowly changes to green, and finally after 4 or 5 days blood and pus occur. There is rarely any vomiting. The temperature, which is usually not high, reaches its height about the time of the appearance of blood and pus, gradually declining until it becomes normal on the seventh to the tenth day. This type is apt to drag to a long convalescence, usually without temperature, except in cases of complicating pyuria, which is common.

Type 3. This type shows diarrhea from the start, and usually mucus, pus and blood in rapid succession within 36 hours. This type rarely has vomiting as an accompaniment, and the temperature is usually not high. As a rule the pus and blood disappear by the end of a week, but mucus diarrhea often continues for a prolonged period, eventually resulting in marked loss of fluid, which is very difficult to combat.

Type 4. In this type the green stool of watery consistency is the predominating symptom. Green mucus appears early, and has the appearance of chopped spinach. The number of stools varies from 3 to 4 per day to 20 or 30. The loss of fluid is rapid and exhausting, the patient emaciating with perceptible rapidity. Vomiting may not occur at all, but when it does, may be so violent that when the combination of vomiting and diarrhea is severe gives the typical picture drawn by the older writers of "cholera infantum." The duration of this type if not markedly choleric runs a course of from 2 to 3 weeks.

The above 4 groups, as described, relate to the diarrheas as seen during the summer months. In the vicinity of Norfolk there is usually a warm spell of weather during the first 2 weeks

of May, at which time a number of cases occur. This is followed by 2 weeks of cool, and often rainy weather. During this period there is an almost complete cessation of cases of diarrhea. About June 1 the steady warm weather of summer sets in, and all through June and the first 2 weeks of July the largest incidence occurs. The worst of the outbreak is over by the middle of July as a rule, though of course a limited number of cases continues to occur for the duration of warm weather.

Occasionally during the early fall, if an unusually warm spell of weather occurs, there is another outbreak. Such an outbreak occurred last fall, the severest I have seen at that time of the year. There were comparatively few fatalities during that outbreak.

As has already been stated, ileocolitis or dysentery may complicate or follow any of the infectious diseases. In 1916, in an article entitled "Grip in Children," I called attention to a gastrointestinal form of grip. This form has been specially prevalent during the past winter in Norfolk. Whether it is actually of influenzal origin I am not prepared to say, but it is always accompanied by an inflamed pharynx which sometimes exists for several days before the onset of the dysentery.

During the present summer, an effort was made at the King's Daughters Visiting Nurses Clinic to ascertain what relation exists between the onset of "summer diarrhea" and the temperature and relative humidity; in addition a number of stools were cultured to ascertain the bacteriology of the cases. The findings of these observations are presented for what they are worth.

Heat and Humidity. The warm weather this summer was exceptionally late in its onset, not being well established until the 12th of June, about 2 or 3 weeks later than usual. The incidence of diarrhea was correspondingly late in its appearance.

The mean of the observations of the local weather bureau was taken as the only practical record. The temperature was averaged each day from the highest and the lowest recorded. The relative humidity was observed at 8 A. M. and 8 P. M. and an average taken. Both of these were obviously misleading on many of the days, since some days there was a sudden drop in the temperature, due to thunderstorms or change in the direction or force of the wind, which would so change the average as to make the mean represent a day much cooler than actually existed

when both the heat and humidity have remained much higher during the greater portion of the day and suddenly dropped very low, thus bringing the average down considerably. The appended chart shows the daily mean curve of the heat and humidity for the period just preceding the onset of diarrhea disturbances and extends to the time when the incidence was established. There appears generally to be a compensatory relation between these curves. There are however, several brief exceptions to these general observations. During the period represented on the chart, the weather was quite cool until May 31, and then began to rise steadily, reaching a pinnacle on June 3. It then gradually declined until June 9 and rose rapidly again for 3 days until June 12. From then on, with an occasional drop, it remained normal summer temperature.

The incidence of cases exactly follows these curves. In stating the incidence, the best history of the mother as to the date of onset of symptoms—usually fever and restlessness, not diarrhea—is taken as the date of the onset and not the date of the visit to the clinic. The first record of the case was a single case of May 29, another with onset of May 31. From this date the number increased very rapidly and reached a pinnacle on June 4. The number gradually declined to June 10 and rapidly rose again to June 13. From then on, the usual number of cases presented. By following the chart, it will be observed that the height of the incidence was recorded the day after the height of the temperature.

The marked difference between the incidence of "summer diarrhea" in the East and especially on the East Coast (more prevalent on the Atlantic than on the Pacific) and the plateau regions between the Mississippi and the Rockies must have an explanation which at some future time will be forthcoming. Heat alone, as a predisposing cause, can hardly account for the incidence since the temperature of the plateau regions reaches a uniformly higher degree than east of the Mississippi. The relative humidity, however, is extremely low in the East, while at Norfolk, Virginia, it averages approximately 75 per cent., while a number of days it attains a much higher level. The question of radiation naturally suggests itself, hence the appended chart. While the curves of the chart prove nothing definitely, it is certainly evident that radiation is greater at a temperature of 100°

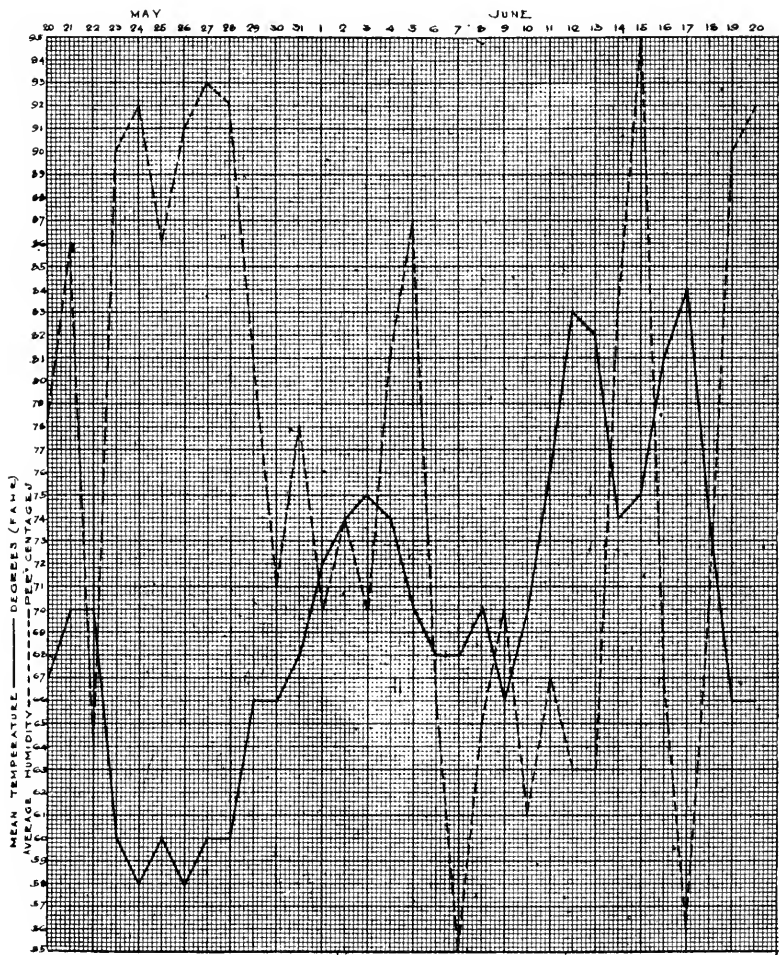


Chart shows the daily mean curve of the heat and humidity for the period just preceding the onset of diarrhea disturbances and extends to the time when the incidence was established.

to 120° (as in the West), accompanied by a relative humidity of 10 per cent., than at Norfolk, with a temperature of 90° and a humidity of 85 per cent.

Bacteriology. The bacteriology of the cases studied differs so little from the findings of other and more competent observers that only brief mention will be made.

The three main groups of organisms found were the dysentery group, the gas bacillus (the first time I have found the gas bacillus infection in this city) and the colon bacillus. The colon bacillus was usually found with either the gas or the dysentery infections, though in several instances the colon bacillus failed to grow. In several other instances only the colon bacillus was recovered from cultures and it would appear that in some cases the colon bacillus outgrew the other organisms and remained in very much larger numbers than are usually found. It was noted clinically that in such instances treatment was difficult and convalescence long drawn out. As stated, this is the first season during which I have found gas bacillus infections in this locality. About 16 per cent. of the cases studied were of this type. These all occurred among the first few cases.

Clinical Types. The type of diarrhea during the present season has been noticeably mild. Comparatively few fatal cases have occurred. During this season the most frequent observation has been that either the green spinach-like stools or those containing mucus, blood or pus have appeared almost uniformly on third day of the illness. There have been, however, a small number which strongly suggest type 1 in my classifications, though rarely so severe. In these cases blood, mucus and pus showed itself within a few hours of the onset accompanied with high temperature and prostration. Most of these cases recovered but several died with marked symptoms of acidosis on the fifth day. I have also seen during this summer two cases of true cholera infantum type.

I wish to extend my thanks to Mr. H. P. Parker, Bacteriologist for the City of Norfolk, for his valuable aid.

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MENINGITIS, CAUSED BY LEAD POISONING, IN A CHILD OF NINETEEN MONTHS.*

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Lead poisoning, so far as I have been able to find in pediatric literature, does not seem to be common in children. Especially is this true wherein meningitis, clearly due to the lead, was the predominating clinical manifestation. Thomas and Blackfan¹, in reporting a case from the Harriet Lane Home of Johns Hopkins Hospital, which was almost identical with the one that I wish to record, reviewed the literature very thoroughly and reached the same conclusion.

The most important symptoms of lead poisoning are colic, "lead palsy" and "lead encephalopathy" in order of frequency as named. The latter broad term has been intended to designate the long known effects of lead on the central nervous system. In certain fatal cases of lead encephalopathy, anatomic changes have been noted in the meninges together with an increase of the fluid in the ventricles or in the subarachnoid space. Thomas and Blackfan, however, in collecting their reports found that only the French observers who have always been interested in poisoning by this metal, had thoroughly studied its effects on the brain and its coverings and insist that there is a special form of meningitis due to lead. The observations which were made in this case seem to confirm this belief, and the source of the lead being the same as in the case of Thomas and Blackfan, together with the fact that this source is common to most children, supports their conclusions that it frequently may be the unsuspected source of what we have chosen to call serous meningitis.

The case was a boy 19 months old admitted to Richard Miliken Memorial Hospital for Children of Charity Hospital on October 5, 1919, for a persistent vomiting and a diarrhea of a mild type. His temperature on admission was 99°. About 10 days before, the child had been seen to bite paint from the rail of the bed, and he began vomiting his food a short while thereafter. He was given castor oil by the parents and after a few days was very much better, but the day before he was admitted

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diarrhea and vomiting started again and he was given another dose of oil.

The child was born at full term at a normal labor and was said to be normal in weight and development at birth. The father is living and well; the mother, previously well, is a patient in the Charity Hospital for an acute appendix. Miscarriages, lues and tuberculosis, or known exposure to latter was denied. The child had been breast fed for about $3\frac{1}{2}$ months, then given condensed milk, cereals and broths to the end of the first year, when he had been fed "everything." Previous to admission the child had been healthy, and teething; growth and development had been normal. The mother later stated that he had a fall from the bed a week before admission. There was a small contusion over the left eye which had already almost disappeared and there was nothing to indicate that this fall was of any consequence.

Physical examination revealed little except that the tonsils were hypertrophied. The vomiting was quite persistent. The stools, 4 or 5 a day, were green in color and contained much mucus and curds. The temperature, during the first 10 days after admission, did not at any time exceed 100° . All food was withheld for the first 48 hours. The stomach was washed and the colon irrigated. Rhubarb and magnesia were given as a cathartic. The vomiting was quite persistent for about a week and at the time was considered more than that which ordinarily accompanies an intestinal disturbance of this type. The lead paint was considered as an etiological factor, but at this stage no signs other than the vomiting could be discovered that would warrant the conclusion that the case was one of lead poisoning. At the end of about 10 days, the child had improved very much and had responded to ordinary dietetic management. Under ordinary circumstances, the child would have been discharged at this stage, but, on account of the fact that the mother was still in the hospital and the child could not be properly cared for at home, he was kept. During the next 2 weeks he continued to improve and was up and around.

One morning the nurse on the ward discovered him biting on the painted rail of the bed, and an examination revealed the fact that he had bitten off some of the paint from the bed. His stomach was washed and he was given a cathartic. The

bed was draped with sheets so that every painted portion that he could get to was covered. For the next 24 hours he did not seem to be any worse for having taken the paint the second time, but at the end of this time he vomited his food and the persistent vomiting and moderate diarrhea returned. These symptoms continued for a week and that the lead was the cause of the trouble now seemed to be the most logical belief. This was confirmed on or about the eighth day when stippled red cells (Grawitz's granules) were demonstrated. Almost at the same time a blue lead line was observed on the gums near the upper incisors.

On the tenth day, after the recrudescence of the vomiting, distinct meningeal symptoms appeared. The head was retracted and the extremities were extended and rigid. Kernig's sign was negative. Brudzinski's neck sign was positive. Brudzinski's contralateral reflex was negative. Macewen's sign was negative, although there was a difference of opinion among several who saw the case which frequently occurs in eliciting this sign. The child's appearance was distinctly toxic. A ptosis of the left upper lid was occasionally present, and the child was comatose the greater part of the time. There was variable pupillary reflex and occasional strabismus of the left eye inward. There was no nystagmus. The respiration was markedly irregular as to depth and time (Biot's breathing), later becoming a Cheyne-Stokes' type. The temperature did not go above a 100° except just before death, when it rose rapidly to 103°—so called terminal rise.

Three spinal punctures were made with the following results:

	1	2	3
Pressure	Slightly increased	Normal	Normal
Amount	10 c.c.	8 c.c.	5 c.c.
Appearance	Clear	Clear	Clear
Cytology	Less than 10, mostly polynuclear	Less than 10, mostly polynuclear	Less than 20 mostly polynuclear
Bacteriology	Sterile	Sterile	Sterile
Albumin	+	+	+
Globulin	+	+	+
Fehling	+	+	+

Animal	Negative	No test	No test
Wassermann inoculation	Negative	No test	No test
Chemistry	Negative to lead	No test	No test

The urine was negative to lead as well as other abnormalities. Ophthalmological examination: discs pale and vessels normal. Blood, other than Grawitz's granules, showed only a mild anemia. There was no leucocytosis. Convulsions were few and milder than would be expected. The child showed little improvement, even after punctures were made and died on the twelfth day after meningeal symptoms appeared. Permission for autopsy was refused by parents.

The fluid findings were those of a serous meningitis. The Grawitz granules, lead line and the knowledge that the child had ingested lead paint on 2 occasions, which in each instance was followed by symptoms, establishes a chronic lead poisoning. The well recognized fact that lead is capable of affecting the central nervous system and the absence of any infection justifies the conclusion that the meningitis was due to the lead poisoning.

Levinson², in a recent paper dealing with the qualitative and quantitative changes in the cerebrospinal fluid in various diseases, found that whenever there is a retention of chemical substances in the blood, there is an increase of the same substances in the cerebrospinal fluid. In nephritis, for instance, where there is a retention of chlorides in the blood, there was found a corresponding increase in the amount of chloride in the cerebrospinal fluid. In uremia, where there is a retention of urea in the blood, the same phenomenon was noted in the fluid and in diabetes, where the blood sugar is increased in amount, there was also observed a marked increase in the sugar content of the spinal fluid over the normal amount usually present.

This would seem to indicate that the lead should be present in the cerebrospinal fluid in lead poisoning but the negative finding would seem to be more in accord with the belief of most observers that under normal conditions very few substances pass from the blood into the cerebrospinal fluid. Quoting Levinson³: "This resistance of the meninges to the entrance of a foreign substance is held to be due to the impermeability of the meninges, although, if we accept the view that the cerebrospinal fluid is

secreted by the chorioid plexus we should speak rather of the impermeability of the chorioid plexus."

Various experiments, too numerous to mention, have been made to demonstrate this property of the chorioid but perhaps those of Dandy and Blackfan⁴, in the last paper on their study of internal hydrocephalus, will serve best to illustrate. As a part of this study they included the oral, intravenous and subcutaneous administration of various substances to determine their presence or absence in the cerebrospinal fluid. These observations were made in animals and patients and they used methylene blue, indigocarmin, phenolsulphonephthalein, potassium iodid, strychnin, morphine, trypan blue, hexamethylenamin and sodium salicylate and were only able to recover the latter two in the spinal fluid. Hexamethylenamin has also been shown to be present in the fluid after oral administration by others and its ability to pass through the chorioid was what led to its use in poliomyelitis.

This permeability of the chorioid, however, seems to be influenced by disease and certain chemical substances. For example, Mestrezat⁵ found that when sodium nitrate is administered to a normal individual before spinal puncture is made, the fluid shows very little or no nitrate, while in cases of meningitis, the drug is present in large quantities. That certain chemical substances may exert a like influence would seem to be indicated by the observation of Ducro⁶, who noted that injections of methyl violet are followed by the appearance of the contents of the blood plasma in the cerebrospinal fluid and in the same proportions found in the blood. He also found that in a jaundice that bile readily passes into the fluid following methyl violet injections. His belief is that the methyl violet paralyzes the secretory chorioidal epithelium and the result is a temporarily inactive membrane. After several hours the effects of the methyl violet wears away and the normal impermeability of the chorioid is restored.

The foregoing observations have a bearing on the case presented, only in so far as the passage of the lead into the spinal fluid is concerned but conclusions can only be reached by experimental work with lead. The passage of the lead into the fluid, however, is not necessary to produce the symptoms in this case which, perhaps, may be better designated as meningism, a term suggested by Dupré⁷ in 1895, this term being now applied to

cases that show symptoms of meningeal irritation in which the fluid is sterile, contains no cell increase and a normal globulin content. The only variance in this case would be the increase in globulin and that it was not relieved by puncture.

The pathogenesis of meningism has been suggested by Levinson to probably be due to mechanical action of the causative agent, which in this instance was the lead. The cerebrospinal fluid is greatly influenced by the blood pressure in the cranium and any irritation reaching the brain by the general circulation, as in pneumonia for instance or through adjacent structures, such as in otitis media, will accelerate the circulation of the blood in the cranium, thus raising the cranial blood pressure and also producing an increase in the cerebrospinal pressure. Whether there is only an increase in the cerebrospinal pressure or an actual increase in the fluid cannot be stated with certainty as long as the mode of origin of the cerebrospinal fluid is not known.

The conclusion that lead should be considered as a possible etiological factor in unexplained cases of serous meningitis or meningism seems to be justified.

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FAMILIAL CIRRHOSIS OF THE LIVER (*Edinburgh Medical Journal*, Feb., 1916, p. 90).—Byron Bramwell records 4 cases of acute fatal cirrhosis of the liver in the same family, the patients being respectively nine, ten, fourteen and fourteen years of age. All the cases presented the same general symptoms—rise in temperature, jaundice and ascites. Death took place in the course of three or four weeks. It was possible to exclude alcohol and syphilis. It is suggested that it is closely related to Wilson's progressive degeneration of the lenticular nucleus.—*British Journal of Diseases of Children*.

FOCAL HEMORRHAGIC ENCEPHALITIS.*

REPORT OF A CASE WITH TRANSFUSION.

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Much has been written within the past 2 years upon a disease to which the various names "encephalitis lethargica," "influenzal encephalitis," "epidemic encephalitis," "epidemic somnolence," etc., have been applied. None of these terms seem appropriate. In case of "encephalitis lethargica," as Bassoe¹ points out, it is the patient and not the disease to which "lethargica" refers. "Influenzal encephalitis" suggests an etiology which has not yet been proven. "Epidemic encephalitis" and "epidemic somnolence" are not definitely applicable, for the malady may not prove at all times to be epidemic in its occurrence.

Of those cases which have come to necropsy, the pathology is constant, consisting of small hemorrhagic foci in the midbrain, hence the term "focal hemorrhagic encephalitis" seems a more correct one than any of those which have been mentioned. The etiology of focal hemorrhagic encephalitis has not been definitely determined. Its coincident occurrence with influenza, in both past and present epidemics, has led most writers upon the subject to accept a definite relationship between the 2 diseases, if separate diseases they be. The general consensus of opinion is, that focal hemorrhagic encephalitis is either a form of influenza specifically affecting the brain, or that the toxins resulting from influenza produce the lesions at a time subsequent to the acute attack, or that an organism or virus different from that of influenza is the causative agent.

In the latter case, it is pointed out, many of these patients have recently suffered from influenza so that their resistance is lowered, consequently they are rendered more susceptible to the organism or virus causing encephalitis. This would explain the coincident occurrence of the 2 diseases.

The preliminary report of Loewe and Strauss² indicates that the disease is caused by a filterable organism resembling that described by Flexner and Noguchi in poliomyelitis. These they observed, when smears from the mucous membrane of the naso-

*Read before the Pediatric Section of the North Carolina Medical Society, held in Charlotte, N. C., April 21, 1920.

pharynx of fatal cases were stained with Giemsa's solution. The authors were able to transmit the disease to monkeys and rabbits by inoculating them with Berkfeld filtrates of nasopharyngeal washings.

Von Wiesner³, of Venice, announced that he isolated a globoid diplococcus from a case of encephalitis and reproduced the disease in a monkey by inoculating the animal subdurally with nervous tissue from a fatal case.

Cleland and Campbell claim they have successfully conveyed the virus of the disease to the sheep, the calf and the horse.

McIntosh⁴, of London, inoculated a monkey with material from fatal cases which died with the symptoms of focal hemorrhagic encephalitis.

Flexner and other investigators have failed to find an organism in the cerebrospinal fluid or in the brain, nor have they obtained any definite results from inoculating monkeys with preparations of emulsified brain and cord substance from individuals dying from the disease.

Flexner⁵, in the *Journal of the American Medical Association*, March 27, 1920, writes as follows: "It is still too soon to say whether or not we are now at the threshold of the clearing up, by way of animal experiment, of the etiology and mode of communication of this menacing disease, as was accomplished so recently, and also by animal experiment, in the case of poliomyelitis. It is to be sincerely hoped that we are. But at this moment, and while waiting for the ultimate and convincing experimental results, one need entertain no doubt of the infectious and communicable nature of lethargic encephalitis."

The pathology of focal hemorrhagic encephalitis is more or less constant. The lesions consist chiefly of perivascular hemorrhages and infiltration of the walls of small vessels with lymphocytes and plasma cells, occurring for the most part in the mid-brain, the pons, peduncles, the basal nuclei, the aqueduct of Sylvius, the floor of the fourth ventricle and the optic thalamus. Less frequently the medulla and the white substance of the spinal cord are affected. There is but little necrosis or tissue destruction.

Of the cases reported by Neal⁶, Tucker⁷, Bassoe⁸, Heiman⁹, Crookshank¹⁰, and Barker, Cross and Irwin¹¹, a total of 138, 86

were males and 52 females. The ages were between 3 months and 55 years.

Symptoms.—Many of the cases of focal hemorrhagic encephalitis reported have not been preceded by an attack of influenza, although a larger number *have* been, an average duration of 2 weeks intervening between influenza and the onset of encephalitis.

The latter is manifested by a progressively increasing lethargy and asthenia, frequently associated with cranial nerve palsies. This triad of symptoms was first observed by French and English writers. The palsies, however, are present in not more than 25 per cent. of the cases. Slight fever is present, 100 to 102° F, and constipation is the rule. Headache and diplopia are frequent symptoms in older children. The patella reflexes may be increased or diminished, more frequently the latter. Rigidity of the body and muscular tremors have been noted in a number of cases. Signs of meningeal irritation, however, are usually lacking (Brudzinski's and Kernig's). Vomiting frequently occurs in the early stage. While usually gradual, the onset may be sudden, being ushered in by a convulsion. Slight optic neuritis may be present, —but not choked disk. The most characteristic symptom is a disturbance of general consciousness. There is first noticed mental apathy and drowsiness which becomes day by day more pronounced until a state of coma is reached from which the patient can be aroused but into which he soon falls again. The immobility of features gives a peculiarly expressionless face. This comatose state may last for several days, weeks, or months, when the patient either gradually improves until entirely recovered, or recovers physically but is left mentally defective, or death takes place.

The muscles paralyzed are more frequently those enervated by branches of the 7th and 3d cranial nerves, resulting in facial palsy or ptosis and ophthalmoplegia, external or internal (pontine and bulbar nuclei). These palsies usually clear up entirely within 2 or 3 months' time, if the patient survives.

Laboratory Findings.—There is present a moderate leucocytosis. Blood cultures are negative. The cerebrospinal fluid is clear and under slight, sometimes considerable pressure. The cell count is, as a rule, low in cases seen late, 5 to 25, but higher in those seen at the beginning of the disease, sometimes reaching

100. The cells are largely mononuclears. Albumin and globulin are increased, and reduction in Fehling's is normal.

Barker, Cross and Irwin¹², attaching much importance to the examination of the cerebrospinal fluid, make this statement: "In our experience, a cell count in the cerebrospinal fluid of from 10 to 100 small mononuclears along with a positive globulin reaction with negative Wassermann and negative bacteriological smears and cultures is, at the time of an epidemic of encephalitis, strong corroborative evidence of the existence of the disease in a patient in whom the process is for any other reason suspected to exist."

Prognosis.—The mortality according to the English Government Report is about 20 per cent., and this figure seems also to express fairly accurately the mortality in this country from the cases thus far reported.

The course of the disease is within wide limits, varying from a few days to several months. In a majority of cases, the course is protracted to 5 or 6 weeks or longer.

There is not enough data to form an opinion as to the percentage of patients who are left mentally defective. Two of Heiman's 9 cases in children, whose ages fell between 4 months and 13½ years, became imbecilic. The treatment of the disease has been purely symptomatic.

The foregoing is a brief résumé of focal hemorrhagic encephalitis as described by various authors up to the present time. The chief object of this paper is to call attention to the striking result which the writer obtained by transfusing a 15 months-old infant who was suffering from the disease, and for this reason, the case will be reported somewhat in detail.

Baby A., female. Age 15 months, was seen first August 16, 1919. The other 2 children born to the parents were living and well. The mother has had no miscarriages. There was no tuberculosis in the family, nor any exposure to it. The baby had not had influenza, nor any other disorder prior to the present one. She was born at term, labor having been normal, birth weight 8 pounds. She had always been well and strong up to the present illness, and had developed as the normal baby should. She sat up without support at 6 months of age, stood alone at 9 months, and said 2 or 3 words at 13 months. She had been nursed every 3 hours from birth (7 feedings), and recently had been having an ounce of cows' milk after each nursing.

The present illness dated back 4 weeks, at which time the baby seemed to be sleeping more than usual. No particular concern was felt over this until the somnolence increased to such a degree that at the end of a week she only aroused for her nursings and would immediately lapse into the comatose state. She had remained in this condition up to the present time. There had been little, if any fever, no tremors or paralyses. She was obstinately constipated.

Physical Examination.—Weight $16\frac{3}{4}$ pounds; height $30\frac{1}{2}$ inches; circumference of head 18 inches; of the chest 16 inches. Color very pale and skin waxy in appearance. Muscles flabby. Patella reflexes not obtained. Anterior fontanelle $2\frac{1}{2} \times 1\frac{1}{4}$ c.m. Eyes: negative, no ocular paralyses. Mouth: tongue heavily coated, corners of mouth excoriated from drooling of saliva, 6 incisor teeth present. Ear drums: negative. Physical examination of the throat, thorax, abdomen, liver, spleen, genitals and extremities, negative. Temperature normal. Blood: red blood cells, 2,600,000; hemoglobin, 35 per cent.; white blood cells, 5000. Urine: amber, acid, specific gravity 1010; albumin, faint trace; sugar, negative; diacetic acid, negative. Microscopic: 5 or 6 white blood cells per field (low power), no casts.

Lumbar puncture was performed and 3 c.c. of clear fluid removed under normal pressure. It contained 2 to 5 cells. Albumin: trace. Sugar: trace by Benedict's test.

The baby was observed for 2 days. It was with difficulty that she could be aroused from the deep stupor. While undergoing a lumbar puncture, she lay with expressionless face and closed eyes, the only evidence of pain being shown by slight twisting of the body. On account of the marked degree of anemia, it was decided to transfuse her.

On August 19, 1919, 60 c.c. of blood, obtained from the mother, in 7 c.c. of $2\frac{1}{2}$ per cent. citric acid solution was introduced into the superior longitudinal sinus. This blood was previously tested against that of the infant, and vice versa, for hemolysis. After transfusion, the lips and finger nails became pink and she nursed vigorously an hour later.

On August 20, 1919, the day following the transfusion, the red cell count was 3,000,000; hemoglobin, 43 per cent., and white blood cells 6,500. When seen this morning, she was sitting up in bed fingering toys. Her general appearance was very much

better. For several hours at a time during the day she was wide awake, would grasp objects placed into her hand and make cooing sounds. Her diet was regulated and she was sent home.

On September 1, 1919, twelve days later, she was seen again. She did not seem drowsy, but evinced little interest in anything. She did not follow objects or sounds. Her physical condition was distinctly improved. The mother says she is drowsy at infrequent intervals, but does not sleep much more than she did before she became ill.

September 13, 1919, 12 days later, and 25 days from the time of transfusion, symptoms, relating to the nervous system, were noted and had developed rather suddenly on the previous day—continuous spasmodic twitchings of the muscles of the left side of the face and right arm. Mouth was held open, and coarse tremor of tongue present and constant drooling of saliva from corners of mouth. At frequent intervals guttural sounds were uttered. The lower extremities were unaffected. The weight was 17 pounds 2 ounces. Red blood cells 3,000,000, hemoglobin 50 per cent., white blood cells 7,000.

September 22, 1919, tremors of face and arm were less marked. Dermatitis of face from constant drooling. Baby does not notice objects or sounds. Hemoglobin, 55 per cent.

October 11, 1919, weight 18 pounds. Physical and mental condition improved. Tremors less marked. She notices objects, takes watch in her hand, and reaches for mother. She cannot stand alone.

October 28, 1919, tremors have entirely disappeared. No further mental improvement. She sits with mouth open and vacant expression. Cannot stand alone.

January 8, 1920, physical condition improved, appetite good, bowels regular. No tremors. No improvement in mental condition.

SUMMARY. We have an infant of 15 months of age who, for 3 weeks, had been in a state of profound somnolence, with no evidence of improvement taking place either physically or mentally as time went on. She was transfused with blood from her mother (who had not had influenza), and a striking improvement followed almost immediately, so that within a short period of time she came out of the comatose state into which she had been for so many days. Her appetite returned, she gained in

weight, the blood picture rapidly improved, and the obstinate constipation was overcome.

All indications at the present time point towards the child's being mentally defective. Whether or not there will be a restoration of, or improvement in, the mental faculties, it is impossible to say. It is, however, hard to disassociate the rapid and sudden betterment in the child's physical condition from the effects of the transfusion.

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UNUSUAL LOCALIZATION IN INFANTILE PARALYSIS (La *Pediatria*, 1917, xxv, p. 270).—U. Provinciali describes two cases: (1) A girl, aged 2½ years, with paralysis and flaccidity of the whole of the lower trunk with atrophy and abolition of the knee-jerk. Movement was preserved in toes of right foot and absent in left. The paralysis extended partly and in a less degree to the upper limbs. On putting the patient in a sitting posture with the arms forward there was a right dorsal scoliosis, while in the left flank a hollow was noticed. During expiration the abdominal walls on the right side bulged out like a hernia. (2) A girl, aged 2 years, with marked atrophy and paralysis of the right leg, with equino-varus position of foot and absence of knee-jerk. On crying a psuedo-hernial protrusion on the right abdominal wall was seen.—*British Journal of Children's Diseases*.

THE IMPORTANCE OF LUMBAR PUNCTURE IN INTRACRANIAL HEMORRHAGE OF THE NEW-BORN.
REPORT OF A CASE WITH RECOVERY.*

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Intracranial hemorrhage of the new-born is not an uncommon occurrence. On the contrary, it is much more common than any of us know, due to difficulties in its recognition in some cases. At times it is not only very difficult of recognition but even impossible to make an absolutely certain diagnosis, antemortem. It may occur in any type of delivery. The most usual history is that following a prolonged labor, with or without instruments. It may occur, however, in the so-called normal labors and not infrequently does it happen to the premature baby. Two such cases have occurred in my practice in the last 3 years.

This condition was first properly interpreted by Sarah McNutt¹ in 1885. It was brought more into prominence some 25 or 30 years later by Little. That the majority of these cases are born dead or die soon after birth we do not wonder at. However, there are a certain number who do survive. Of the total mortality under 1 year of age, 30 per cent. is due to congenital disease, of which syphilis ranks first and this condition not far behind.

Etiology. The cause of this condition may be divided into 2 general heads. First, spontaneous, or hemorrhage due to a general condition, as hemorrhage of the new-born. Second, and most common cause is traumatic. Under this head the most common causes are: (1) prolonged, tedious or hard labor, with or without instruments; (2) precipitate labor with injury of the child's head; (3) injudicious use of pituitary extract; (4) breech extraction of the aftercoming head; (5) premature babies have very fragile blood vessels, which are not strong enough to undergo the amount of pressure necessary even in a normal delivery, hence their predisposition to this condition.

It is unquestionably true that a large majority of the infantile cerebral paralyses occur either in first born children or in those who have been born after prolonged, dry, hard labors.² That prolonged, hard labor is a most important factor in the pro-

*Read before the Pediatric Section of the North Carolina Medical Society, April, 1920.

duction of this condition, I think, goes without question. The early, intelligent application of the forceps will reduce the length of labor, thereby reducing the length of time the head has to undergo this pressure. Other things being equal and the mother's condition good, is it not wiser to cut down the period of labor and not wait until the mother is exhausted and the fetal heart is imperceptible before offering help?

Pathology. If we think for a moment how delicate the brain tissue and the capillaries of the new-born must be, we wonder why more cases do not occur. The bleeding may occur any place in the cranial cavity, in the vessels of the dura mater, in the pia mater, in the arachnoid membranes, in the brain tissue or ventricles. It may be small and punctate or it may be diffuse and cover one or both hemispheres, forming a clot of varying size and thickness. It may even occupy a third or a fourth of the cranial cavity, in which event it will cause compression of the brain substance and back-pressure of the venous circulation, and, in turn, may rupture other capillaries. If the clot covers any other area than the motor area, we may get no symptoms at the beginning, but later a condition of imbecility or epilepsy may develop with no other signs. The location more than the amount is likely to give rise to symptoms. We may have quite a large hemorrhage in the so-called silent area without giving symptoms at the time of bleeding. A small hemorrhage in the motor area is more apt to give rise to symptoms. Hemorrhage at the base of the brain may give rise to symptoms not unlike meningitis, due to basilar irritation.

How long the blood stays in a fluid state or how long it takes the blood to clot is not definitely known but we do know that it does not clot so readily as it does on the outside of the body. When a lumbar puncture is done on some of these cases, as much as 2 ounces of fluid blood, which clots readily in the test tube, has been obtained.

When you get that much pure blood on lumbar puncture I do not think that it can with fairness be attributed to a contaminated puncture. This happened in the one case which I am reporting with recovery. In this case I obtained 2 ounces of pure blood on lumbar puncture 1 hour after the first convulsion, and 5 days after delivery.

Mouno³ reports a series of 40 autopsies on infants dying

within a few days of birth in which he found 10 cases of rupture of the tentorium and 5 of the falx cerebri. In all of these cases death was due to hemorrhage following the rupture, though the diagnosis was made first at the autopsy table. This emphasizes the frequency of the condition as well as the infrequency of its recognition.

Green⁴ reports 2 cases diagnosed before autopsy, one dying on the third day, the other on the seventh, the latter showing a negative spinal fluid. Both of these cases showed much fluid blood with small clots on the surface of the hemispheres. Each of these cases gave a history of nursing well and appearing normal for 2 and 3 days respectively, at the end of which time "they refused to nurse, had a feeble cry, developed a peculiar pallor and facial edema." Neither of these cases had any of the typical signs of compression.

Thrombosis is not an infrequent finding and in some cases would seem to be the only explanation of the symptoms shown.

Symptoms.—To have a new-born baby nurse well for 2 or 3 days and then refuse to nurse, become pale and listless with intermittent periods of crying spells followed by stupor and perhaps convulsions or twitchings of one or more muscle groups should make you think of a hemorrhage, and especially so if the mother had a hard or instrumental delivery. Convulsions following an instrumental delivery should always make one suspect this condition. The following are the signs to bear in mind: convulsions or twitchings of one or more extremities, bulging fontanel (not a constant sign), nystagmus, strabismus, which is more or less constant, increased reflexes, which may be more marked on one side. Stiff neck and Kernig's sign may be present if the irritation is confined more to the base of the brain. The pulse is strong, full and at times slow. The respirations are irregular, they may be superficial and rapid or they may be slow and deep or may even simulate Cheyne-Stokes'.

While any or all of these signs may be present in any one case, there are other cases which show none of these signs as was shown by the 2 autopsy cases reported by Green⁴. I wish to emphasize that there is no harder diagnosis in medicine to make, with certainty, than these cases which show none of the typical signs. Any obscure illness of the new-born, which can not be satisfactorily explained any other way, should make us

think of hemorrhage or thrombosis, especially if there was a difficult labor.

It must be borne in mind that all symptoms may be entirely absent at birth, and, so far as the mother knows, the baby has been perfectly well until about 8 or 10 months of age. The mother brings the baby to the office because she does not think the baby has been developing as a baby of his age should. He does not sit up, does not grasp objects or show the proper interest in his surroundings. On physical examination nothing definite is usually found and the doctor tells the mother to go home and stop worrying about the child, for he will be all right or he will "outgrow it." A more careful examination will probably show that this child has an increased spinal pressure of 10 or 20 mm. of mercury, not infrequently signs in the eyes, denoting intracranial pressure, as papillitis or distended and engorged veins.

There is another or older type which may come to the doctor about the age of puberty, either a few years older or a few years younger, because they have "peculiar spells." He may have epileptic seizures with or without the loss of consciousness, or he is unmanagable and incorrigible. These are some of the latent signs of hemorrhage of the brain in the new-born. Whether we have symptoms in early infancy depends upon first, the location, whether it is in the motor or the silent area and second, the size of the hemorrhage. I think every one will agree that there must be cases of birth hemorrhage which do not give any symptoms and which get entirely well. Freeman⁵ refers to a case which had all of the signs of hemorrhage and compression for which he advised an operation. The parents refused operation and nothing was done and the child made a complete recovery. No lumbar puncture was done. This was a fortunate outcome, which, in my mind, represents a very small percentage of these cases. The risk of following this as a routine is apparent.

Diagnosis. In every case of suspected intracranial hemorrhage a lumbar puncture should be done. It will help in 3 ways: (1) letting off the spinal fluid will relieve the intracranial pressure and stop the convulsions, and will make the child more comfortable in every way; (2) it may cure the patient; (3) it will be an aid to diagnosis. If pure blood is obtained by lumbar puncture in amount more than could be explained by "contaminated

puncture" or if the blood flows as freely at the end as at the beginning, we are fair in assuming that there was free blood in the spinal canal. The use of the spinal mercurial manometer will enable one to tell with certainty the exact intracranial pressure. The normal intracranial pressure of an infant is 2 to 5 mm. mercury. The majority of these cases will show an intracranial pressure of from 5 to 25 millimeters of mercury.

The findings in the spinal fluid are not constant. The spinal fluid may be almost pure blood, and may be as much as 2 ounces in quantity. There is an admixture of spinal fluid with the blood and you may get 3 or more ounces in all. The spinal fluid may show no abnormalities, or it may show only a few red cells with some broken-down red cells. In some cases one gets an amber colored spinal fluid with hematin pigments. This I have seen in 2 cases.

Case Reports. Case 1. E. C. R., age 5 days, male, the result of the first pregnancy, birth weight 6 lbs., full term, abnormal delivery. The mother had eclampsia and just before delivery had 1 or 2 convulsions. The labor was induced and took about 14 hours, was hard and tedious and was terminated by the use of forceps with difficulty. The mother's condition was so serious at the last that the life of the child was not considered, for it seemed that the mother would surely die. At delivery the cord was around the neck twice and it was with difficulty that the child was made to breathe. On physical examination the child was poorly nourished and weak. He had a double cephalhematoma with 2 or 3 forceps marks on the head. He had to be fed with the medicine dropper, for he would not nurse. Nothing unusual happened until the fifth day after delivery, when at 8 P. M. the child had its first convulsion, which was general and lasted about 5 minutes. Two other similar convulsions occurred in the next hour. At 9 P. M. the child showed a bulging fontanel, a peculiar pallor and a double internal strabismus. His knee jerks were active and equal, and there was no Kernig's sign and no stiff neck. A lumbar puncture was done and 3 c.c. of fluid was obtained, of which 2 c.c. were pure blood. The spinal pressure reading was 15 mm. of mercury. The baby had a very good night, had no more convulsions and nursed the mother the next morning and continued to nurse her for 10 months. A lumbar puncture was repeated each day for 4 successive days,

at which time the fluid became clear and the pressure normal. He had an uneventful recovery and at 12 months weighed 22 pounds. His mental and physical development has been normal. He is now 20 months old and is normal in every way.

Case 2. O. V., aged 3 years 5 months, female, the result of the fourth pregnancy, the mother had a miscarriage at 3 months, 2 other children living and well. The child was delivered of a breech presentation with difficulty in delivering the after-coming head. Mother was in labor from Wednesday 11 A. M. till Thursday 9 P. M. Twenty-four hours after delivery the baby began having general convulsions at frequent intervals continuing for 48 hours, having probably 30 or 40 convulsions in that time. For the first 8 months of the baby's life, she slept very little and cried a great deal of the time. The child never nursed, was fed modified milk with the spoon at first and when it would take the nipple at 3 weeks of age it was started on the bottle. The feeding history was not a rational one and may have accounted for some of the sleeplessness and crying. Physical examination showed an undernourished and underdeveloped child, color fairly good, muscles soft and flabby. The child was unable to sit or stand up, could use her legs and they were not stiff but made no effort to use them in walking. Her present weight is 20 pounds 9 ounces, her birth weight is unknown but she was an average size baby. Measurements: height 33 inches, circumference of head $18\frac{1}{8}$ inches, chest 19 inches, abdomen $17\frac{1}{2}$ inches, right calf 6 inches, left calf $5\frac{3}{4}$ inches. She cut her first tooth at 8 months, has 20 now in good condition. She understands what is said to her but can say only 1 or 2 syllables. Her blood count and urine were normal. Spinal puncture showed 10 mm. of mercury pressure, while the fluid gave a negative Wassermann and a normal cell count. The retinal veins were engorged and distended. There was no choked disc.

Case 3. N. M., male, 3 years, the result of the second pregnancy, the first pregnancy resulting in craniotomy of child before he could be delivered, 2 other living children, well and healthy. All labors are hard and long with instruments. Chief complaint is stiffness of the legs and inability to stand alone or to walk without assistance. He was born at term, birth weight $9\frac{1}{2}$ pounds, nursed his mother 8 months, then fed mixed diet. He sat up at 7 months, talked at 18 months, cut his first

tooth at 8 months, walked first at 18 months, but never very well, and less well now than he did 6 months ago. Physical examination shows a well nourished child, good color, muscles firm with those of the lower extremities unusually firm. His knee jerks are very active and equal. Eyes: pupils equal and react to light and accommodation, the disc is blurred and the veins distended and tortuous. He has a positive Kernig's sign on both legs and a very active patella reflex. His gait is that of a spastic diplegia. Measurements: height $38\frac{3}{4}$ inches, circumference of head $20\frac{1}{2}$ inches, chest 22 inches, circumference of calves and thighs equal, weight 36 pounds. Spinal pressure was 20 mm. mercury, cell count normal, Wassermann negative.

Case 4. M. D., aged 7 days, girl, premature 7 months, result of the second pregnancy which followed 11 months after the first. The labor was normal and the baby did very well, nursed well and had a pink color and cried vigorously. On the fifth day, the baby refused to nurse, had 1 or 2 slight convulsions, became quite pale and stupid, but at times would cry out. On examination the fontanel was tense, there was a double Kernig's sign, no stiffness of the neck. Lumbar puncture gave an amber fluid which registered 8 mm. of mercury. On examination there were some broken down red cells and 20 red blood cells intact, to each cubic millimeter. The child died the following day; no autopsy obtained.

Case 5. J. L. W., aged 17 years, male, result of the first pregnancy, mother was in labor 3 days, instruments used. At end of 48 hours the baby began to have convulsions and 3 or 4 convulsions each day for the first month. There are 3 brothers and 2 sisters living and well. Past history: he had diarrhea his second summer, has had jaundice twice, no other illnesses. He has always been an unmanageable child, will not work at one position more than 2 or 3 days. He has escaped from an institution for the feeble minded 3 different times. He frequently goes away from home 3 and 4 weeks at a time, sleeps in the woods and either begs food or eats barks or roots of shrubs. When asked why he does this he gives a simple grin and says because he wants to run away. On physical examination he looks like a mental defective, his eyes are dull and vacant in their expression, has a thick skin and coarse dry hair. He is well nourished and has an unusually large nose. His tempera-

ture, pulse and respirations are normal. His blood pressure is 105 systolic and 50 diastolic. His height is 67 inches, weight 111 pounds. His spinal fluid gave a negative cell count and negative Noguchi reaction, the Wassermann on blood and spinal fluid was negative and his spinal pressure was 18 mm. of mercury. His optic disc was pale and the retinal veins were distended and tortuous.

Treatment. In all cases of suspected birth hemorrhage, a lumbar puncture should be done for diagnostic as well as for therapeutic purposes. Repeated daily lumbar punctures, until the spinal fluid is clear of blood, are indicated in these cases with the use of the spinal mercurial manometer to register the intracranial pressure each time. By this means one can determine whether the pressure has been reduced to normal as well as drain off as much blood as may come by this route. After having done this, if there are any focal signs, such as twitching of any group of muscles or eye signs, as papillitis or marked venous engorgement of the retinal veins, a decompression operation should be considered and a surgeon called. I feel, however that it is wiser to call a surgeon with the first symptoms that he may be better able to advise as to the advisability of operation. The question of an operation is an important one and if it is going to be done should be done early, before the clot organizes, if we expect the best results. Up to 1914, only 17 decompression operations had been reported for this condition. Of this number 7 recovered, 4 of these were operated on by Cushing while 5 others he operated on died.

Aspiration of the subdural space by puncture through the coronal suture at the lateral angle of the anterior fontanel has been done by Henschen⁶ with good results. Giles⁷ has reported 1 case cured by aspiration of the subdural space or as he called it, "decompression cranial puncture."

More recently Dr. William Sharpe¹¹, of New York, has operated on a number of these cases and his results are as follows: Of 27 cases treated by Dr. Sharpe, "9 had a cranial operation, 4 had lumbar puncture drainage, while the others did not have a definite increase of the intracranial pressure—so 'latent' types—and recovered life without operation or repeated spinal drainage. Five of these cases died, 3 following the operation. Unless the intracranial pressure is very high in these new-born cases,

they should be given the opportunity of recovering life and the greatest ultimate normality by repeated spinal drainage."

The advisability of an operation in these cases is a difficult one and will have to be decided on the individual merits of the case. We know that cases have recovered with only a lumbar puncture. Up to the present time, 4 cases have been reported cured by lumbar puncture. Brady⁸ reports 3 cases treated this way, with 2 complete recoveries. In 1916 Green⁹ reported 1 case cured by lumbar puncture, and in the same year Lippman¹⁰ reported another case.

The importance of the early recognition of this condition can not be emphasized too strongly. In the beginning, if an operation should be done, it should be done immediately if the best results are to be obtained. A lumbar puncture should be done on every case. It will not only relieve symptoms but it may even cure the patient. The spinal mercurial manometer will accurately determine the intracranial pressure.

Aside from the medical aspect, it is of economic value to the State that these little fellows get a square deal at birth. The world is too full of imbeciles, idiots, spastic diplegias, paralytics, epileptics and other less defectives who are occupying our institutions as well as are in our best families, who would probably have been normal, valuable citizens had they been given a "square deal" at birth. Might Cesaerean section not be substituted for high forceps and the length of labor not be cut down by early intelligent application of the forceps, when the mother's condition will warrant it?

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THE PROPHYLAXIS OF ILEOCOLITIS*

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There is no specific prophylactic treatment for acute colitis and yet I know of no other infectious disease against which intelligent measures can be used so satisfactorily. The prophylaxis consists in keeping every child's resistance above or as near normal as possible and in feeding the child nothing but clean, well adapted food; all of which is much easier said than done. There is a well-founded dread of the second summer. The explanation for the greater prevalence of colitis among children between 12 and 24 months of age, rather than among younger infants, lies, not so much in the fact that children of the former age have been weaned and are cutting difficult teeth, as in the fact that these children are crawling and walking. The young infant stays on the bed or in arms. The older child on foot or on hands and knees, makes excursions of exploration during which he comes in contact with many germ-laden objects. The bulk and the shape of many of these are such that the baby cannot get them into his mouth, but nothing daunted he tests their palatability by licking them with his tongue. Ofttimes the object, whether it be a dead fly, a piece of coal, a tack, an apple core, a ball of hair, rat excrement, or what not, is of such size as to permit ingestion. A piece of manure cast off by father's boot and the remains of Fido's dinner appeal to the baby's peculiar appetite as morsels equally delicate and savory. The foreign body swallowed and then passing along the sensitive mucosa of the intestinal tract exercises a multiple function; at one time it plows, it fertilizes, and it sows the seed; and the harvest of colitis is always an abundant one.

A play pen, of dimensions to limit the amount of floor space over which the baby may crawl but to encompass an area sufficient to permit exercise, is a good prophylactic device. The floor of the pen should be covered with a detachable piece of oil cloth, linoleum or sheeting. Whatever article is selected for this purpose, it should be kept scrupulously clean.

Only toys with smooth, easily washable surfaces should be allowed in the pen. The toys should be of such construction that no part of them can be detached and swallowed.

*Read at meeting of Medical Association, State of Alabama, April 22, 1920.

Notwithstanding popular ideas to the contrary, a baby can have just as good time playing in cleanliness as he can in filth and dirt. Far less cruel than to permit the baby to crawl over dirty floors making promiscuous mouth-gatherings would it be to leash and muzzle him. Although I have paid my respects to the "pacifier" on many previous occasions, I make no apology for again calling on you to condemn this abominable device. The iniquity of its use is found not only in its breach of the sanitary code but of the moral law as well. The thing cannot be kept clean and it destroys the contour of the baby's mouth. Its immorality is that it serves neither as a food nor to any other useful purpose. Sometimes it is called a "fooler," which is more nearly descriptive, but the most appropriate name is "liar," since it conveys the first lie from parent to child. The parent, guilty of this first lie, continues throughout parenthood with the same careless disregard of responsibility. Look around you and see if that isn't so. Clothing is an important consideration. During the spring and early summer, we have in this state and in neighboring states some excessively hot days followed by nights that are chilly. Young children are exceedingly sensitive to such quick atmospheric changes. So far from being endangered by quick changes in clothing to meet these weather changes the baby is protected thereby. If the days are hot, strip to the thinnest garment; if the nights are chill, put on a shirt and a gown of sufficient weight to keep the child comfortably warm. It does not lie within our power to change the weather but unless our minds are befuddled by traditions and superstitions we can exercise common sense enough to adjust the baby's clothes to atmospheric conditions.

During the summer, if any breeze is stirring, it should be courted for the baby and the latter should be kept in the shaded open. Sometimes when the air is still and hot, it is cooler indoors than outside. After such a day there is no objection to the baby sleeping out in the open, provided he can be protected from mosquitoes and other nocturnal insects. If economic conditions are such as to prevent screening the entire house, the baby ought to be screened. This can be done at slight cost and is always a paying investment, as it prevents flies from gaining access to the baby and the baby's food.

The baby's face and hands should be kept clean. To refresh him and keep him clean, the baby should be bathed frequently

both inside and outside. If he is teething, shaved ice between feedings will cool and soothe the gums and furnish additional water.

Guard the baby against excitement and too much romping. See to it that he gets his naps at regular intervals and that the household does not interrupt or disturb his sleep.

After observations made over a period of more than 5 years, I am convinced that for artificially-fed babies it is safer to use, during the summer, dry milk rather than pasteurized fresh milk. The incidence of colitis among children fed on dry milk is considerably less than among children using boiled or raw milk. I have never seen a case of rickets or scurvy traceable to the use of dry milk. I heartily commend the efforts of municipal boards of health to pasteurize all market milk which does not meet the requirements of safety. The city government ought to have just the same right to enforce laws to assure its citizens of a safe milk supply as it has to enforce laws to keep its water supply safe. Until such right is granted and exercised, prohibition laws relating to intoxicants should be regarded as another illustration of the folly of putting "the cart before the horse."

With the very first indication of bowel trouble in summer, the child should be treated actively. A dose of castor oil should be given at once and food should be stopped until it can be determined how serious is to be the disturbance. The possibilities of food contamination and the source thereof should be investigated. The food formula should be readjusted to suit the indications. If there is evidence of an inflamed condition of the bowels, a bowel irrigation should be given after the oil acts. Instruct the nurse or the mother how to irrigate the bowel. It cannot be done with an infant syringe and a cupful of water. One or more gallons of saline, as hot as the infant can stand with comfort, should be used. I do not advise the use of the colon tube but insert the nozzle of the tube of the fountain syringe just well within the rectum. The hips of the baby should be elevated. In this way and by using a larger amount of water I believe the colon will be as nearly reached as when the colon tube is used. There is danger even in experienced hands of mechanically injuring the bowel with a colon tube. By prompt measures such as these I am convinced that many cases of colitis can be aborted.

Finally, I believe that acute colitis should be made a reportable disease. The bowel discharges from a colitis case are as dangerous as those from a typhoid fever case. Whenever possible the person who administers water, food and medicine ought to do only that and nothing more for the patient. Bathing and changing the soiled diapers should be done by some one who will not touch the things which are given by mouth. Whoever handles the patient and takes care of the diapers should be given explicit directions as to precautions necessary to keep her hands from being a menace to herself and to others. Soiled diapers should be kept in a covered pail in antiseptic solution. After washing they should be thoroughly boiled. I am convinced that if boards of health would use their influence and legal authority in efforts to have every case of colitis handled properly, much could be done to limit the occurrence of this dread disease.

TREATMENT OF CONGENITAL MEGACOLON IN CHILDREN (Re-
vista di Clinica Pediatrica, June, 1920). Magliani describes Francioni's method of treating this condition by introducing a long flexible tube into the rectum. This overcomes the kink that is the cause of the obstruction. He assumes that the sigmoid loop is unusually long or for other reason gets kinked or otherwise occluded. By allowing the escape of gases and feces, the disturbances are corrected and time is given for the anomaly to be outgrown or compensated. He leaves the tube in place for a number of hours, up to thirty-six, and reintroduces it at intervals of four or five days or oftener as symptoms develop. In two cases reported in detail, an infant 19 days old and a child of nearly three presented intense tympanites, cyanosis and stupor, but almost immediate relief followed the intubation. In each case the tube seemed to meet with an obstacle past which it had to be worked. Conditions were apparently permanently corrected in the infant in a few days, but the treatment was kept up intermittently for several months in the older child. This intubation should certainly be given a trial, Magliani adds, before resorting to surgical measures in young children.—*Journal A. M. A.*

THE DIPHTHERIA CARRIER.

By W. L. FUNKHOUSER, M.D.,

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Scientific research has added materially to our present control and management of diphtheria epidemics. In our enthusiasm over our ability to detect susceptibles and their immunization by toxin-antitoxin, we must not overlook a time-honored procedure—the detection and cleaning up of individuals harboring virulent diphtheria bacilli in their nasopharynx and throat.

As an example of a pandemic throat infection among school children with the diphtheria bacilli, I wish to give the following report: The writer, at the time, was responsible for the handling of an epidemic of diphtheria which seemed imminent in a small Georgia city. There had been no case of diphtheria reported from April to July 10 of that year. The public schools opened the first Monday in September. By the latter part of the month, 8 clinical cases of diphtheria were reported in one ward, several manifesting their first symptom in the school room. All the children in this school were cultured. Examinations of cultures were made at the laboratories of the State Board of Health. The report was as follows:

October 9, of 61 cultures, 46 were positive.

October 10, of 47 cultures, 32 were positive.

October 11, of 50 cultures, 30 were positive.

Total, 158 cultures, 108 positive, or 68% positive..

This school was immediately closed. Recommendations were sent to the city authorities that all carriers be quarantined. This was attempted but the protest among the parents was great, owing to the fact that none of the 68 per cent. showed any clinical symptoms of diphtheria. Several children, however, whose throats showed the diphtheria bacilli present came down later with the disease.

Simultaneously, 4 clinical cases were reported in another ward with 1 death, the fatal case having attended school 30 hours before. All children from this school were cultured, then dismissed! The report of the cultures from this school was as follows:

October 16, of 39 cultures, 28 were positive.

October 17, of 28 cultures, 24 were positive.

October 18, of 35 cultures, 28 were positive.

October 19, of 129 cultures, 95 were positive.

Total, 231 cultures, 175 positive or 75% positive.

This makes a grand total of 389 cultures taken, 283 being positive and 76 negative; 30 were marked contaminated.

Reports of clinical cases of diphtheria came in rapidly from other wards, making a total of 26. There being no rigid enforcement of the city ordinance requiring the reporting of contagious diseases, and the clinical manifestations in most cases being mild, many therefore possibly overlooked, it was estimated that there were, no doubt, twice as many cases as had been reported.

All the city schools were closed. There was, naturally, some public sentiment against the closing of the schools; a feeling among many implied, if not expressed, that it was a useless procedure, especially in view of the fact that the clinical cases were mild, there being only 1 fatality. The school board assumed the logical and sensible attitude that a loss of 1 month or even 2 to save 1 life was a justifiable procedure. To offset any objection which might arise as the result of ignorance, so that we could use persuasion based on enlightenment, rather than force on ignorance, intensive publicity campaigns were instituted, until the public accepted with confidence the following recommendations:

1. All clinical cases strictly isolated.
2. Two successive negative cultures before clinical case released.
3. After release, room inhabited by clinical case fumigated with formaldehyde gas.
4. The doctors to enlighten the public regarding the dangers of the disease and manner of conveyance.
5. Physicians report all cases of diphtheria, including suspicious cases.
6. Carriers to be kept at home; not to mingle with others.
7. Carriers required 2 successive negative cultures before being allowed to attend school or to mingle in society.
8. Antitoxin administered promptly in all positive or highly suspicious cases.
9. Attendance of children at Sunday School or any gathering discouraged.

There were similar outbreaks in other parts of the State, which

so crowded the laboratories of the State Board of Health that they were unable to give any local assistance, either by sending a man or by examining more than 50 specimens a day. An appeal was made to the United States Public Health Service and they sent relief. A laboratory was established and plans were made to open the school with only those showing negative cultures. Children and teachers were called for culturing at certain hours, then immediately dismissed. Those found negative were allowed to return the next day; those positive were not admitted until after 2 successive negatives.

On November 6, schools began to be re-opened, having been closed 19 days. The children's throats showing the diphtheria bacilli present were re-cultured from time to time until finally, December 7, all were found negative, no clinical cases having been reported in the meanwhile. No measures were taken to treat the throats of the carriers but it was the intention to have the cultures of persistent carriers tested for virulency but they all cleared so rapidly that this was not necessary. Close daily inspection of all throats was made; on slightest suspicion, a culture was taken and the child sent home until the next day. None of these suspicious cases proved to be either diphtheria or carriers.

The result of the first examination of cultures for reopening school was as follows:

High School,	370 examined, 42 positive or 11.3%
Grammar School,	535 examined, 99 positive or 18.5%
Primary Central,	137 examined, 8 positive or 5.8%
Primary 4th Ward,	184 examined, 22 positive or 11.9%
Primary 5th Ward,	173 examined, 23 positive or 13.2%
Primary 6th Ward,	165 examined, 21 positive or 12.7%
Primary 7th Ward,	161 examined, 28 positive or 17.3%
Colored 6th Ward,	372 examined, 60 positive or 16.1%
Colored 7th Ward,	120 examined, 8 positive or 6.6%
Colored 5th Ward,	93 examined, 6 positive or 6.4%
Colored 4th Ward,	43 examined, 6 positive or 13.9%
Teachers white,	42 examined, 3 positive or 7%
Teachers colored,	9 examined, 0 positive or 0%

Total . 2404 examined, 326 positive or 13.5%

Age of school children who were found to be carriers:

Age:	6	7	8	9	10	11	12	13	14	15	16	17	18
Female:	11	16	14	19	14	20	12	13	8	3	2	3	1
Male:	16	10	13	22	24	22	23	21	15	8	5	4	4
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Total carriers:	27	26	27	41	38	42	35	34	23	11	7	7	5

Epidemiological data is about as follows: In May, a case was reported, another in July. No other cases were reported until after school opened in September; 6 being the total in this month, with one death; in October, 20 cases were reported. Each case was investigated to ascertain the following facts: Church or Sunday School attended; theatre, circus or school attended; visiting in homes with sickness, especially sore throat; or visiting in other towns or cities. Result showed 16 had attended school but many had been otherwise exposed; of these 16, 4 developed their first symptoms in school.

Pennington, in Philadelphia, found that 10 per cent. of apparently healthy school children had diphtheria bacilli in their throats, one half of which were non-virulent. The investigation of the Massachusetts Board of Health estimated that 2 per cent. of the inhabitants of any city will show diphtheria bacilli in their throats and 8 to 50 per cent. if exposed to the disease. There are similar reports from other sources. These findings in diphtheria complicate the carrier problem, yet Williams' report of the control of a recent epidemic by searching out the carriers in the school, families of the patient and all exposed to clinical cases and then requiring from the known carriers a negative culture before being released, proves how necessary it is to reckon with carriers.

This evidence seems to substantiate the value of detecting and excluding from school carriers, when there are clinical cases of diphtheria in a locality, especially among school children. With all measures at our command for the control of diphtheria, we may well bear in mind the words of Rosenau, "It is plain that the control of diphtheria outbreaks in institutions, camps, on ship-board, in schools, and in similar places where a number of people are crowded together, as well as the final control of epidemic outbreaks in cities and towns, depends eventually upon the recognition of carriers and their isolation."

SOCIETY REPORT

THE NEW YORK ACADEMY OF MEDICINE— SECTION ON PEDIATRICS

Stated Meeting, Held March 11, 1920

DR. CHARLES HENDEE SMITH, *in the Chair*

THE ADVANTAGES OF HOME OVER INSTITUTIONAL CARE

DR. MINER C. HILL stated that the home care of children had many advantages over institutional care which were not generally appreciated. The investigations of Dr. Henry Dwight Chapin of New York and Dr. Holsclaw and Dr. Rude of San Francisco showed that institutional care was far from ideal. The latter investigators found a 50 per cent. mortality in the foundling asylums of San Francisco. Among the same type of infants boarded out in private homes under supervision the mortality was reduced to 12 per cent. Comparing the mortality rate of sick children in the hospital and sick children treated in the homes was not fair to the hospitals because they were receiving more serious cases. Hospital care for surgical conditions and many medical conditions was, and always would be, essential. But the writer was of the opinion that a great many medical cases, now treated in the hospital ward, could be more successfully cared for in the home. If the child must have hospital care, the shorter the stay the better for the child. It had been the unhappy experience of some of them to see the "boarder baby," well and robust on admission to an institution, steadily decline under what was considered ideal institutional care. There was rarely a sufficient number of nurses to give the constant individual attention an infant required. This was well illustrated by the fact that when a feeding ward was light the gains in weight were greater than when the ward was filled to capacity. In the home, time was always found to give affection as well as routine physical care and it was not uncommon to see a foster mother holding a baby on her lap or carrying it about. This change from the prone position and the exercise unconsciously obtained

undoubtedly improved the baby's general tone. Admitting the value and necessity of hospital care, we should bear in mind that its prolongation was bad for the baby, did not educate the parent and was expensive. Those who had had the opportunity to observe results of institutional and home care under the same supervision were favorably inclined toward the home care. For instance, the Gramercy Nursery was opened March 1, 1916, as a temporary shelter for infants whose home care had become impossible through the illness or death of the mother. This nursery had a capacity for 7 babies, was well equipped and efficiently managed. During the year 1917, fifty-six babies were cared for, the cost per child per day being nearly \$3.00, and the average weekly gain 4 ounces. The mortality was 4 per cent. The work was worth while, the results were good but the costs were excessive, owing to a constant overhead expense. After consultation with Dr. Chapin, the nursery was reorganized on a boarding-out plan similar to the work of the Speedwell Society. From October 1, 1917, to October 1, 1918, 115 babies were cared for on the boarding-out plan at \$1.29 per day with an average weekly gain of 5.15 ounces; that is, in using the boarding out plan twice as many babies were cared for with a greater weekly gain at less than half the per capita cost of institutional care. The greatest difficulty of the boarding-out plan was the finding of suitable foster homes within a workable area. The Health Center of the Bowling Green Neighborhood Association had shown what could be done in the home care of sick children. Instruction in preparing formulae, giving baths, enemata, ear irrigations, etc., were given the parent by the nurse at the Health Center and in the home. During acute illness, the case was referred to the Henry Street Settlement nurse who made 1 or 2 visits daily as requested, and the Health Center physician or family doctor visited the home to direct the medical care. With this equipment it was necessary to send few children to the hospital. A reduction of the mortality rate for this district from 232 in 1913, to 59 in 1917 was a good index of the practicality of the health center idea. In neighborhoods where there was no hospital, it would seem practicable to have a small receiving ward in connection with a health center. Here each acute case could be observed for a day or two, during which time the usual laboratory work could be done, and the baby could then be returned to its home or

assigned to a boarding home where the foster mother showed particular aptitude for caring for the condition from which the child was suffering.

PROBLEMS OF BOARDING-OUT WITH AN ATTEMPTED SOLUTION

DR. HENRY DWIGHT CHAPIN said the present drift of opinion was strongly against the collective management of abandoned infants and little children in institutions. There had been an extraordinary agreement on this question among those who had had the widest chance for observation and experiment. The carefully selected foster home was for the normal child the best substitute for the natural home. This was the opinion held as far back as 1909 by a conference on the care of dependent children held in Washington, D. C., at the call of President Roosevelt who was much interested in this vital human problem. Ten years later, an international conference of Red Cross workers, held at Cannes, gave what could fairly be said to represent the best world thought on this question as follows: "Permanent institutional care for infants and young children should be discouraged on account of the almost insuperable difficulties in maintaining nutrition in infancy under these conditions and because of the great susceptibility of young children to infection. Preference should be given to placing such children in suitable families. All crèches, day nurseries and the like should be under close medical inspection. The 2 main difficulties of boarding-out consisted in selecting suitable homes, and in exercising constant and proper supervision."

Dr. Chapin said that in 1902 he had developed what was known as the Speedwell System that represented a sustained effort to regulate and systematize boarding-out so as to place its good effects at a maximum and its possible bad effects at a minimum. This had been accomplished by what might be called the unit system of intensive boarding-out. A unit was a neighborhood that had been selected after a survey had been made to learn the general conditions of healthfulness and the number of good homes that might be available in the locality. There was then inaugurated a constant oversight especially as to diet and hygiene, on the part of a salaried physician and nurse who were thoroughly familiar with this class of cases and knew how to deal with them. The work was kept up during the whole year and not

limited to certain seasons. An important educational work was carried on among the families taking their children. The simple machinery that endeavored to really and permanently help the abandoned and ailing child, at the same time assisted in educating each community in which it operated in the prevention and cure of disease and the care of its own ailing children. This by-product involved improved social ideals and a higher standard of living, and might be made a very important feature of this work. In the successful working out of this plan, the human effort was the important factor, and the system, in order to attain its greatest efficiency, called for high grade workers, who could idealize their efforts, and for good family homes, where the boarded-out child would be reared under constant and intelligent supervision.

A unit might include a part or a whole of a village or a ward in a city. Their experience had shown that it was a mistake to be too fastidious in selecting homes. If the woman of the household had motherly instincts and fairly healthy children of her own, and seemed fairly teachable, a certain amount of dirt and disorder could be overlooked at the start. A porch or back yard or some open space was essential, as plenty of fresh air was one of the most important features of this work. The next step was to select a committee of women, living in or near the locality selected for the unit, who were familiar with the neighborhood and the people, and who constituted the local managers of the undertaking. The records kept of the children were uniform in all the units and careful histories on a card system showed the conditions and results of their care. Their experience showed it to be a mistake to attempt to keep too elaborate and complicated a system of histories. The object of this work was not research but helpfulness to the children, and not many data were required for this purpose.

In comparing the results of institutional care with systematic boarding-out, it would be found that both mortality and morbidity were less under the latter plan. The incidence of communicable disease was much less among boarded-out infants. From Nov. 30, 1918, to Dec. 31, 1919, the one Speedwell unit at Morristown, N. J., cared for 172 children and among these there were only 2 deaths, and these occurred in infants under 6 months of age. The unit at Yonkers, N. Y., cared for 84 children with 4 deaths.

After considerable experience they had found that this method

was not adapted to handling acute sickness that was better managed in a hospital. In the earlier years of experiment, all kinds of cases were sent out to the boarding homes, such as acute toxic infections, unresolved pneumonia, and, in the summer months, many babies, who were near death from bowel disturbances, in the hope that change and fresh air would give them a chance. This gave a hospital mortality and the foster mothers became fatigued and discouraged, and did not possess the necessary nursing skill or appliances. After the acute disease had subsided, however, the results in convalescence had been most satisfactory. It was rarely possible for an infant or a young child to get well in a hospital. The results in difficult cases of wasting, or atrophic infants taken from institutions or tenement houses, had been most encouraging. Finally, the children had always left their care in good physical and mental condition, such as would be apt to follow a more or less prolonged stay in a natural home.

The daily per capita cost for 1919 was \$1.23 for the Morristown unit and \$1.20 for the Yonkers unit. The cost for 1920 would be higher. It was becoming increasingly difficult to secure good homes for little babies, especially of the atrophic type. They required constant care night as well as day, and were liable to die in spite of all that could be done for them. There should be a sliding scale of prices, paying women who took care of such cases a much larger sum than was usually allowed. They now give \$18 a month and paid for the best grade milk, but this payment must be still increased if necessary to hold women on this important job. If the lives of these little waifs were worth anything, they were worth more than was usually paid to try to save them. It was to be remembered that in this boarding-out plan there was no interest on invested capital, no overhead expense in running a plant, and no remitted taxes to be counted in the cost. If the large institutions would sell their expensive plants and use the money in intensive human service, that was in paying doctors and nurses, with more generous treatment of foster mothers, this problem would be in the way of solution. A few small plants could serve as collecting stations, which would be all that would be necessary from the institutional standpoint when operating this form of regulated boarding-out. Dr. Chapin said that these babies are not getting a fair deal. We should try to give them

natural and watchful care in the way they need. They are brought into the world singly, not in droves, and they suffer in the crowd.

Dr. Chapin said he would like to see every city develop this work according to a plan he presented which would consist of various collecting units in the city that would be in constant communication with units in the surrounding villages. Thus far the Speedwell System had developed 3 of these units, one at Morristown, one at Yonkers and one at New Rochelle.

THE BOARDING-OUT DEPARTMENT OF THE NURSERY AND CHILD'S
HOSPITAL.

MISS EDITH A. HOOPER read this paper (to be published in a later number of ARCHIVES.)

Discussion—DR. SMITH said he hoped he would be pardoned for speaking at this point in the meeting, but there was one aspect of this problem which had been touched upon only lightly and which he wished to bring out before the discussion rather than after it. This was a matter of temporary care for infants in emergencies.

Dr. Smith said he did not wish to uphold the institutional care of infants as opposed to boarding-out in the least degree, but he thought there was a place for small, well-conducted temporary shelters to meet sudden emergencies or for cases where the care need to be only very short.

The Manhattanville Day Nursery had been conducting an experiment in this kind of care for the last 2 years. The managers of this institution had believed for a long time that there was an urgent need for emergency care, consequently when their new building was erected, one ward was set aside for day and night care. This ward was especially equipped with glass partitions forming small cubicles for each bed. This separation of the patients, with careful examination and history of exposure on admission, had seemed to control the contagious disease problem. Whooping cough, chickenpox, scarlet fever, diphtheria and influenza had all been admitted during the incubation period. However, up to the present time, there had been no development of secondary cases. Day and night care required more highly skilled attendance than the ordinary day nursery staff. It had been found necessary to have a trained nurse for superintendent,

and a trained nurse in charge of the night baby room, with 2 or 3 untrained assistants. These cases also require more frequent visits by an attending physician. In spite of the cost of the extra equipment and the extra cost of maintenance for this work, the Manhattanville Day Nursery feels that it is very much worth while. As a matter of fact, the receipts for the care of these 12 to 14 babies were nearly one and two-thirds times the receipts for the day care of approximately 55 children. While it was not possible to say that the night babies actually paid for their keep, they very much more nearly did so than the nursery children who are supposed to be the main business of the nursery. Babies were taken whose mothers had suddenly become acutely ill or died. In such cases, boarding-out was very difficult and temporary shelter must be found until the family had a chance to look around and readjust itself. During the mother's absence for confinement or surgical operation, the temporary shelter also was of value and the institutional care was not prolonged long enough to do the child any great harm. It seemed as if there was an obligation imposed upon the day nurseries to take up this work more generally. At present there are 31 children on the waiting list for "emergency" care at the Manhattanville Day Nursery, so the need was obvious. The hospitals were not equipped, with few exceptions, to admit well babies. The day nurseries would seem to be the only agencies to properly step in. Great pressure was being brought upon them to take up this work more generally.

HON. JOHN KINGSBURY, ex-commissioner of Charities of New York City and at present head of the War Relief in Serbia, said that as he listened to Dr. Chapin's remarks it was with a great deal of sorrow rather than gladness. He felt sorrow when he thought that the City of New York had not grasped its great opportunity to get behind a work of the kind done at Speedwell, and of work such as was done at the Manhattanville Day Nursery which was a step towards Speedwell. Dr. Chapin had established the work at Speedwell and shown what it could do some years ago and had kept hammering away at it year after year, and yet the city went on putting more and more money into institutions. If that money were put into skilled nursing care for children in homes, thousands, instead of hundreds of children could be saved today. He believed, however, that this method of caring for children in homes was coming and that New York would soon wake up to

its opportunity. Physicians knew the number of children in institutions and that the death rate was cruelly and murderously high. If one wanted to get some idea of what this death rate had been, he need only read the records of Randall's Island before it was used as an institution for the feeble-minded. Forty or 50 years ago Randall's Island was a morgue for little babies, the death rate being 100 per cent. That was decreased when they began to board babies out. After all we had made great progress and should not feel discouraged.

Mr. Kingsbury said it might be of interest for the moment to know something of what was being done for the babies of Serbia. Serbia was not a country of little babies, but as a people they were little children. Serbia had lost more in the war and has less today than any of our allies. There was a popular illusion that Belgium was the greatest sufferer from the war, but the truth was that of all the nations in the war, Belgium had suffered the least with the exception of the United States in both loss of life and property. Serbia lost one-third of her population and her boys retreated into the mountains of Albania and many perished. Serbia was a country of widowed mothers and children; the babies had mostly died. Serbia through all her sufferings of a thousand years had still an unconquered soul. Serbia was going to profit by taking the stand that it is better to die in beauty than to live in shame. But she will live. She has written on her statute books the most progressive child welfare laws. Today they have elevated the importance of the child to the extent that they have created a special cabinet office and have a national department of health. In this country we had a Bureau of Child Welfare tucked away in one department and a Bureau of Public Health Service in another department. Serbia wants the experience of America. They are asking for trained nurses and doctors, and are going to ask the experienced men and women of this country to give them the benefit of their experience. They are going to ask these doctors and nurses to go over there and help translate into action the legislation which they have enacted. If this was carried out to even the extent of 50 or 75 per cent. it would place them in the position of leaders in child welfare and public health work. Serbia is translating into action what we have held as ideal. Mr. Kingsbury said his hearers had before this heard him and heard Mayor Mitchel say that they believed that the home

with the mother in it was a better place for children than the best managed institution in the land, and he was glad to hear that there was a movement toward having these plans carried out. They were going to carry out similar plans on the other side of the water.

DR. PHILIP VAN INGEN said he did not think many of us realized what Dr. Chapin had been doing for the last 18 years. The Speedwell Society, which, at any rate until the last few years, was Dr. Chapin, for without Dr. Chapin it would not have existed, had done a splendid work. Dr. Van Ingen said he had watched the progress of this work, and it had been one of the most effective factors in dealing with one of the biggest problems that we faced in regard to dependent children. Mr. Kingsbury had spoken of the statistics of Randall's Island 40 or 50 years ago, and stated that we had made great progress. It was true we had. Seven years ago he had had occasion to look into the mortality of children under 2 years of age in New York State. During the period studied, there were 28,210 children cared for by 11 institutions, and the death rate for children under 2 years of age was 422 per 1,000 or almost one half. In New York City at the same time in one institution the mortality rate for children under 1 year of age was 516 per 1,000. That was what we had done up to 7 years ago. We had already done a great deal in 1917. One great trouble was that it required too much red tape to get the children out of the institutions. The child was usually dead before anything could be done, but at last somebody was trying to meet the emergency. Austria-Hungary was not a popular country to talk about, but in 1903 they passed a law that every child under 15 years of age was entitled to care, clothing, food, education and a home. If the child did not have parents who could give these things it was the job of the State to see that he got them. By 1910 the system was developed to such an extent that no matter what the cause, any child brought to one of the 17 state asylums was admitted. If it was found that the parents could support the child, they were compelled to do so and to pay a penalty; if the parents could not support the child, the State took care of him. The child was kept in an institution long enough to see that it was physically fit, or not acutely ill, and then placed in one of the colonies of which there were 374 in the country, and in these colonies they

had a mortality rate of 200 per 1,000. At a little later date in our State, we have a mortality rate of 422, and in one institution in New York City a mortality rate of 517 per 1,000. Many of these children under state care in Hungary were illegitimate, and as was well known the death rate among this class of children was high, so that had really accomplished something. The one thing that had stood in the way of our work in this country was that we did not know what other people were doing. We established a great many excellent things and when they were fairly started we found that other countries had been doing the same things for many years. That applied to maternity centers and to baby welfare work, etc. We did not know what others were doing; we simply tried to thresh a thing out for ourselves without learning first of the experience of others. As an example of the poor management that had been noted, Dr. Van Ingen recalled an instance that occurred when Mr. Kingsbury was Commissioner of Charities, and which Mr. Kingsbury had told. A woman with 6 dependent children went to the Department of Charities to get relief. They said they would give her some help, so they took away 4 of her children and gave her 4 children from an institution to board.

MISS ROGERS, of the Henry Street Settlement, stated that the Henry Street Nursing Service had always emphasized home care for children, and while the nursing service exemplified the care of sick children rather than of dependent children, they would be most enthusiastic over one of Dr. Chapin's institutions in their neighborhood. The visiting nurse had for a long time stood for a long felt need in the community; today she stood to a greater extent than formerly for the educational and social factor in the community which was a very large factor. The training schools for nurses had contributed so far much more toward enlarging the opportunities for nursing by giving them a worthwhile service in pediatrics. They felt that in any nursing service the nurse must have a large understanding of children and in field work she might develop that understanding in a complete way. The nurse had to do much as the social worker did in entering a home. She had to adapt the necessary care of the child to the environment of the child and this was considerable of a problem. One encountered so many difficulties and there were many natural guardians who did not recognize their re-

sponsibilities. In meeting and solving these problems much could be done by the visiting physician and nurse. They could insist on certain requirements.

In speaking from the standpoint of the Henry Street Nursing Service, it seemed necessary to give a few figures relative to the care of the sick which showed what could be done under seemingly adverse circumstances in the care of children and in the way of preventative measures. Pneumonia, gastrointestinal conditions and many communicable diseases were successfully cared for in the home as well as much maternity work. Statistics showed that about 90 per cent. of all sickness was cared for in the home. There were 4,683 maternity cases cared for by the Henry Street Settlement with 4,348 living births, where the mothers were under prenatal care and supervision; the infant death rate per 1,000 was 9.8 for nearly 5,000 cases. Among 1,000, in whom the care and supervision was only postnatal, the mortality was 14.2 per cent., the city death rate for infants under 1 month being 37 per 1,000. The miscarriages and abortions under prenatal care were 6.8 per thousand. The number where there was no prenatal care was 35.7 per 1,000, and the number of still births under prenatal care only 21 per thousand. Where there was postnatal care only, the number of deaths per 1,000 births was 34.5. The figures for feeding cases were much more difficult to give because there were so many affiliated agencies doing this work, but those for pneumonia were more interesting. The figures for 1918 and 1919 were not given because of the influenza epidemic, but those for 1916 were fairly representative for any year. The number of pneumonia cases cared for in 1916 was almost 4,000, with a mortality of 8.67 per cent. Out of this number 1,564 were Italians, with a mortality of 181 or 11.6 per cent.; 1,221 were Hebrews, with a mortality of 38, or 3.1 per cent., giving an interesting contrast as regards nationalities. They found a marked difference among the various nationalities in studying the feeding cases. One found many cases of rachitis if he went into the Italian districts. In 1916 and 1917 the average death rate from pneumonia in the age group under 5 years was 8 per cent., while during the influenza epidemic it was 16 per cent., twice the usual rate for pneumonia.

The visiting nurse needed to do so much more than merely to observe the sick when she entered a home. She had to

recognize the family group and the social responsibilities. Frequently social conditions underlying the illness and the social condition was a much bigger problem than the actual illness. Frequently these conditions had to be considered in coöperation with affiliated agencies. The dependent child or the one that needed supervisory care they met with every day, and they wished they might have larger and better facilities today in meeting that need.

MISS THEIS, of the State Charities Aid Association, said their work was largely that of placing children in permanent homes. Their experience, she stated, bore out what Dr. Chapin, Dr. Hill and Miss Hooper had said as to the better general development of children in homes. In regard to the death rate in homes, their children were mostly in free homes, and they had not had a single death in 1916. In 1918 and 1919 there were 6, 1 due to pneumonia, 1 boy was killed and 4 died of influenza. A great deal had been said with reference to the physical improvement of the children in these homes, but a word might be said with reference to the child's own point of view. Miss Theis said she had personal oversight of 2,000 children, placed in temporary boarding homes in preparation for permanent homes. Almost without exception these children wished to remain in the homes. I have asked the staff of these homes how many children wished to go back into institutions and they said they had known of only 6 children who wished to return. That was most convincing that the children did not wish to go back to institutions, yet the homes in which they were living were by no means ideal. Their one terror was the fear of being sent back to an institution, and this was used, unwisely she felt, by some persons as an aid to discipline. The Nursery and Child's Hospital furnished them the largest number of children. One of the advantages of the boarding-out system was its elasticity, inasmuch as the size of the organization could be increased or decreased as the need required.

MISS ARNOLD, of the Babies' Welfare Association, said that speaking for all the social workers she could say that they were looking for the day when the Speedwell idea would be generally adopted. The agencies now doing that work had long waiting lists of children who should receive that care. There was also a demand among parents for boarding homes for children. They

had had 1,990 parents seeking homes for children for whom they wished to pay. There were 2,000 homes licensed by the Board of Health. A duplicate list of these homes was given to the Babies' Welfare Association so that they could know where they could find homes that would provide care for their children. Their information, however, was somewhat limited, as they could not get out and make investigations, but through Dr. Baker, of the Bureau of Child Hygiene, they received the duplicate reports from the Board of Health. The nurses also came and told them of specially good homes for babies and older children. If a father or mother came with a baby under 2 years of age, they put the matter on a business basis. They demanded of the woman who took the child that she should take it to a milk station. They then telephoned to the milk station nearest the home and had the milk station see that the babies were duly enrolled. In the Bronx the supervising nurse had a system whereby the visiting nurses advised her when there was a demand for more foster homes. There was more of a demand for foster homes than there were homes. Dr. Smith spoke of the 6 babies brought to the Manhattanville Day Nursery in 1 day. There was always a demand for homes for young babies, and they had offered special inducements in order to find homes for a limited number of babies, and they could not find homes even at \$10.00 a week. There was a wonderful field for that kind of work. Where the mothers had died the fathers were very anxious that their babies should have home care. Sometimes fathers come and ask that their babies be placed in an institution, and we explain to them the advantages of home care and find a home for the baby. Later if something happens that it is necessary to make a change, these same fathers will come and tell us just what they have been told some time before in regard to the advantages of home care. The Babies' Welfare Association had 156 homes, about which it had special data for parents. She thought Mr. Kingsbury would be interested to know that a large majority of their 1,990 babies came from the Department of Public Charities.

DR. SIDNEY V. HAAS said he wished to say a word in favor of institutions, though, of course, everyone familiar with this question knew that even in a poor home a baby was better off than in the average, or, perhaps, in any institution, and no one deserved greater credit for trying to force this fact on the public

than Dr. Chapin. But after 18 years of effort the results showed housing for only a small group of children. All who had spoken could mention only a few thousand boarding homes. Mr. Kingsbury several years ago said there were several hundred thousand children requiring such homes. What were they going to do with the children in the interval until a boarding-out system was built up and sufficient homes secured? There was at least 1 institution in the city the statistics of which were quite different from those they had heard this evening. This is the Home for Hebrew Infants. There they had had a death rate between 1915 and 1919 of from 3 to 7 per cent. They had the death rate of 7 per cent. in 1917, when they had an epidemic of measles. The year of the influenza epidemic they had a 6 per cent. death rate. In normal years the death rate was about 3 per cent., and they housed about 400 children under 5 years of age. These children did not look white and marantic. As a matter of fact, they compared favorably with children in private homes. They often received children in deplorable condition and after having them for a time showed just such results as Dr. Chapin had shown they were getting at Speedwell. Some of these cases were received from boarding homes. This did not mean that in boarding the children out they were not doing good work; it only showed the difficulties of the problem and what a great field under present conditions would have to be covered. If it could be undertaken by the Government it might be made possible.

It might also be of interest to know the cost of caring for these children in the Hebrew Orphan Asylum. The cost of caring for the infants was \$7.30 per capita per week, about what Dr. Chapin's babies cost. In 1918 the cost was \$8.12 per week, which was less than Dr. Chapin's estimate for that year.

It might also be of interest to know that since May, 1916, they had been using the Schick test, except in a small group which was used as a control—no case of diphtheria occurred except in this group. Diphtheria was practically eliminated from this institution. While they were attempting to obtain proper homes and to build up a practical Speedwell System, institutions could be improved and by the adoption of the cubicle system the children could be kept free from contagious diseases. Many of the children at the Home for Hebrew Infants were the ruddiest, finest youngsters, so he thought that while they were waiting for Dr.

Chapin's system to develop, they should not lose sight of the many things that could be done by improving institutions.

RECTAL FEEDING (Journal A. M. A., May 18, 1918). E. E. Conwall calls attention to certain facts and principles to be taken into consideration in rectal feeding. First, he says, proof is lacking that the colon possesses adequate digestive capacity, hence all food introduced this way should be thoroughly predigested, if not already in forms suitable for immediate absorption by the colonic mucosa. It is necessary to think of the protein ration in terms of amino-acids and of particular forms of these, because the proteins of foodstuffs split up into different groups of amino-acids, and the body not only requires a definite variety but requires them in special proportions. Articles of food whose protein contains potentially all the amino-acids the body needs in approximately ideal proportions are meat, milk and eggs. Meat and eggs are undesirable because of their tendency to putrefy. Milk is free from this disadvantage to a great extent, and it is obvious that the milk should be fresh and unboiled to save its enzymes and vitamins, and should also be skimmed to free it of considerable fat. Glucose in solution supplies carbohydrate in a perfectly available form. Salts are also necessary, and those of milk approximate the body requirements, and desirable salts can be introduced to a limited extent by fruit juices, which add in the form of levulose a carbohydrate, which seems to be capable of absorption to a limited extent. Lactose, the carbohydrate of milk, is apparently not available for fuel, but its lactic acid fermentation makes it useful in preventing putrefaction. Other salts, especially those of sodium and calcium, are required if rectal feeding is to be long continued. The essentially alkaline character of the diet must be kept up, to prevent acidosis, a chemical menace to life as great as the bacterial one. The vitamins, needed by the body to utilize its food are of two general classes, the water soluble and the fat soluble. The former can be supplied by milk, cereal decoctions and fruit juices, and the latter by milk. Two prescriptions, or sets of prescriptions with their possible modifications, for rectal feeding, covering the above principles are given by the author. The enemas should be given warm, 100F. and slowly, the patient's buttocks should be elevated, and he should lie on his right side for an hour after the injections.—*Journal A. M. A.*

ARCHIVES OF PEDIATRICS

OCTOBER, 1920

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SOME PECULIARITIES IN THE SYMPTOMATOLOGY OF CHILDHOOD.

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In our text books on pediatrics prominent space is given to consideration of the peculiarities of disease as observed in childhood. Although these variations as occurring between young and older subjects are discussed quite in detail from the stand-points of etiology, pathology, symptomatology, diagnosis and prognosis, apparently little effort is made to offer an explanation for them. This paper will concern itself with some of the peculiarities shown by children in the expression of disease both subjectively and objectively and the reasons for them.

It is evident that the greatest contrast occurs in infancy and the early years of childhood, and that such difference is less noticeable with the approach to adult state. When mention has been made of the great susceptibility of the infant to unaccustomed external stimuli, the instability of control of all bodily functions due to incomplete development of the central nervous system, and the influence of rapid growth on such functions, one is struck by the difficulty of preparing the subject for presentation, because of the fact that much of the detailed material seems too obvious to bear lengthy discussion.

In 1915, an article appearing in the *Lancet Clinic*, in which certain general observations were made on the indications of disease in children, was reviewed at length in *Progressive Medicine*, partly as follows: "In the absence of an evident cause of illness, fever during the first week of life may be assumed to be of the inanition type. Severe prostrating fever, beginning in the second week of life, may, in the absence of marked intestinal disturbance or other evident cause, be considered due to sepsis. In children over 1 month or under 2 years of age, intestinal toxemia is the commonest cause of fever. If the temperature falls and remains low under catharsis and starvation for 24 hours, the diagnosis is confirmed. If fever continues for 3 or 4 days, otitis media should be thought of, even in the absence of aural or mastoid symptoms. A sustained high temperature of 103° or 104° in infants should always be treated as a lobar pneumonia until a definite diagnosis can be made. In a child over 3 years of age, free from signs of pneumonia, continuous fever should lead to a tentative diagnosis of typhoid. A remitting fever, persisting day after day without apparent cause, should always arouse a suspicion of pyelitis and lead to an examination of the urine."

As the original article was intended to lay down general rules only the attitude of the reviewer is interesting in that it seems to indicate his readiness to accept these general considerations without reference to the fact that although children may differ in the expression of their ills, the same methods of investigation are applicable to them, and that the logical interpretation of their symptoms leads as directly to diagnosis as is the case in adult life. This is quoted then by way of introduction, because it seems

to indicate the usefulness of a review of some of the differential points in the diagnosis of children's disease.

In general, the whole subject of the incidence of disease at different ages, and the variations of bodily reaction to it and to all stimuli from without rests upon the immunity peculiar in the infant to certain types of affections, his susceptibility to others, and his general lack of adaptability.

The infant's inherited immunity protects him for his first year from certain forms of infection. Most of the acute infectious diseases are rare at this period. About this time, however, he comes to the point where he must acquire by experience the immunity and adaptability which will, when complete, place him in the adult category.

It is during, and because of, this process of acquirement that the child exhibits the greatest variations in disease expression. For instance, the 2 extremes of the development of one form of bodily defense are shown in the action of immature as opposed to adult tissue to foreign cellular invasion.

Cancer cells can be readily grown upon the membranes of the egg. A cancer plant, however, in a full grown fowl is promptly destroyed by phagocytic action of that adult animal. If these cancer cells are planted on the membranes of an egg mixed with embryonic spleen tissue, they will live upon this spleen tissue. destroy it, and flourish. If on the other hand, the same plant is mixed with the spleen pulp from an adult fowl, the cancer cells are themselves promptly destroyed.

As a general proposition, the immaturity referred to and the instability of governing centers, to be mentioned later, may explain all the idiosyncrasies shown by sick children, but there are some peculiarities in childhood which admit of more definite and detailed physiological or pathological explanation. It is with such a group of symptoms that this article concerns itself.

Temperature, pulse and respiration occupy a most prominent place in all bedside records. Children show some interesting peculiarities in these respects. A distinct elevation in the temperature curve of the adult chart usually connotes change of importance and often gravity. On the other hand, a temperature of 104°, observed in a 5 days old infant, frequently associated with extreme irritability and prostration, is as often produced by lack of fluids or food, as by any serious bodily lesion. Obviously

pyrexia, due to dehydration, is common to both adults and children. However, elevation of temperature follows hunger or withdrawal of fluid in children much more promptly and to a greater degree than is ever seen in adults, often accompanies mild disorders, giving no evidence of disease, and, if given undue consideration, will greatly exaggerate the clinical picture. Conversely, a temperature which in the adult will result in evident discomfort, will in the child often be tolerated without discomfort, and be overlooked unless revealed by the clinical thermometer. Lusk has shown that the temperature of a fasting adult is normal until the end of his fasting period, when it may be subnormal, but that it is never elevated. Why should a child have fever when the adult does not? This may be accounted for on the ground that the capacity for heat production in the infant is greater than in the adult, both actually and relatively—actually, because infant metabolism is 3 times greater than the adult; relatively, because heat production varies directly with surface area, so that the smaller the body, the relatively greater the amount of heat produced. It may be said, in reply to this theory of heat production, that diminished heat loss, not increased heat production, is the true cause of pyrexia.

On this hypothesis the important factors become not metabolic activity, surface area and bulk, but *conduction*, *radiation* and *evaporation*, the 3 methods of heat elimination. As the body temperature rises, elimination by conduction, radiation and evaporation increases. The elasticity of the 2 former is not great, being controlled as it is by many physical conditions, such as atmospheric changes and clothing. Therefore, whatever heat cannot be taken care of by conduction and radiation must be eliminated by evaporation, and it is this factor, evaporation, that is both most affected in fever, and the least well developed in the child.

Obviously, in the matter of radiation and conduction, the baby is at a great disadvantage; he is banded, shirted, diapered, dressed and blanketed to a state of such perfect insulation that he can neither profit much by conduction, nor utilize his surface area for radiation. But aside from such material handicaps, developmentally he is embarrassed, because of the late acquirement of the ability to accommodate, without reaction in body temperature, to changes both thermal and humid by calling into selective

action either his mechanical or chemical means of temperature control. Evaporation of perspiration is the expression of this chemical means of temperature control.

In addition to these fevers produced by intrinsic causes, low water and food, and these are somewhat synonymous in terms of infancy, we must consider pyrexias resultant upon extrinsic causes, such as temperature, clothing, artificial heat and humidity. The adult animal is not affected by elevation in temperature or humidity unless the latter reach a point above 87° saturation. On the other hand, infants respond to such external influences promptly and at times alarmingly. Accurate control of incubator atmosphere, if this apparatus is used, is an absolute necessity as the baby's temperature will promptly follow any change in that of the incubator.

In young and old alike, inanition fevers occur when loss of fluid has reached the point of causing loss of body weight. The degree of pyrexia varies inversely with the body weight. Balcar, Sansum, and Woodyatt, in their work on "Fever and the Water Reserve of the Body," have shown the relation between low available fluids and pyrexia. They do not prove that reduced body fluids are either the sole, or the inevitably contributing cause of inanition fever. On the contrary, it is well known that the blood serum shows not increased, but rather decreased concentration in most acute infections of childhood. An exception to this is the finding of markedly concentrated blood serum in intestinal intoxications.

As Finkelstein had previously noted pyrexia in infants given high sugars by mouth, so these investigators found fever resulting from the increased diuresis carried to a point of loss of reserve body fluid produced by administration of sugar solutions *intravenously* in dogs. In both cases the water available for evaporation is removed and thus the chemical temperature control embarrassed. In these experiments again, the degree of temperature produced is found to vary inversely with the body weight. In fevers resulting also from increased affinity of body cells for water, due to their occasionally augmented salt content, water elimination by the lungs and skin is reduced, again affecting the chemical control of temperature by evaporation, and again attacking the weak point in the infant. The conclusion is that when the normal water reserve is reduced, fevers result because

of the lack of water available for evaporation at the normal body temperature. But it is emphasized that in the adult such pyrexia will result only when through preceding cause the body fluid has become reduced to a minimum.

Pyrexia is not immediate. It is a fact that the reserve body fluids in infancy are low, and easily depleted, and that the ability to selectively control temperature is a late development. The whole well-being of the child is bound up in an adequate intake and available reserve supply of water. When pyrexia is caused or aggravated by low fluids, then the child responds more promptly. From these considerations comes an explanation of the prompt, and, at times, excessive pyrexia in infants resulting from reduction of fluids. These, then, are some of the factors playing a part in the causation of this temperature variation in childhood.

THE HEART AND CIRCULATION.—There is a gradual reduction in the size of the heart in relation to that of the body from birth to maturity. Exactly corresponding to this is the reduction of the heart's rate and the speed with which the circuit of the arterio-venous system is completed. While systolic blood pressure relatively corresponds to that in the adult, the diastolic is disproportionately lower.

During the first 4 years the heart's position in the chest is nearly horizontal, with the apex outside the nipple line in the 4th space. From the 4th to the 9th year the apex moves inward and downward to its adult location. In dilatation or hypertrophy the apex beat is displaced more often upward and outward than downward and outward as in adult life. Perhaps the most striking thing about the heart in the child is the great recuperative power shown by it.

For 4 years there was maintained a country convalescent ward in connection with the Bellevue Children's Service, and so an opportunity offered of making a comparative study of this recuperative power of a group of cardiac cases, 77 in number, and 114 children suffering from a variety of other serious illnesses.

These children, cardiac and non-cardiac, were all severe cases, picked out, not because they had reached the usual period of transfer to convalescent homes, but rather because they seemed so sick as to demand something in addition to the routine ward care, if they were to recover at all. Fifteen per cent. less of the cardiacs than the non-cardiacs were discharged as cured, that

is, relieved of all obvious evidences of their disease. Thirteen per cent. more of the cardiacs than the non-cardiacs showed marked improvement in general on their discharge. The average gain in weight was practically the same for both groups. In other words, our cardiacs responded about as readily to treatment as did the average run of cases. This experience emphasizes the great recuperative power that these young patients may evidence, when a proper environment can be provided to meet the needs of the anemia, which is such an important factor in relation to the nourishment of the heart wall itself. The ultimate difference in the proportion of cardiac and non-cardiac cases, who had made satisfactory improvement, was only 2 per cent. The subsequent course of these children was followed in some instances for 1, and in others 2 or 3 years, and the majority showed their improvement to be permanent.

Both cardiac and vasomotor centers in childhood are in a state of most unstable equilibrium; irregularities of action may result on influences in no way related to the cardiovascular system. Thus during active digestion errant impulses from esophageal, gastric and intestinal branches of the vagus, wandering to the cardiac branches of that nerve, probably account for as much embarrassment of action as does direct pressure on the heart from a distended stomach or intestine. Alarming evidences of circulatory failure often accompany insignificant and transient disease due to stimuli subminimal to the adult, but active in these younger subjects. The presence of a roaring harsh murmur over the precordium frequently appears as an evidence of acute conus dilatation attendant upon very slight bodily disturbance, and until its subsidence with the falling temperature, often leaves one in grave doubt as to whether the heart has received actual injury or not.

A red throat, and high fever, accompanied by such a murmur less often mean acute endocardial infection than simple change in the outline of the heart wall at its weakest point, due to vaso-depression. It is not uncommon to find a sturdy infant of 8 to 12 months, pallid, clammy, almost pulseless, with dilated pupils, and every evidence of profound collapse, due to nothing more than the disturbance of vasomotor balance, dependent upon a period of vomiting and refusal of fluids. The accidental heart murmurs heard in connection with rapid temperature rises, and

in conditions of vaso-depression are not always easy of diagnosis from those produced by actual endocardial lesions. They are not confined to the base, but are often loudest at the apex, and transmitted in varying degree to resemble those arising from damaged valves. In quality too they may differ from the usual soft blow of the so-called hemic murmur. They are as quick in development as fleeting and sudden in disappearance. It is therefore not unusual that physical signs which on first examination point to primary cardiac failure or disease, should on second examination prove purely secondary in importance, and functional in character.

Dullness and bronchial voice and breathing, that is, the classical evidence of lung consolidation at the left base, are commonly present in childhood as evidence of enlargement of the heart, or of pericardial effusion. Such signs were observed in a boy of 7, who presented in addition to his cardiac disease, a healed tuberculous hip. On first examination the diagnosis of tuberculous consolidation of the left lower lobe, with probable cavitation, was made, but with the reduction of the cardiac dilatation and effusion, the lung findings became normal, having evidently been due entirely to pressure from the enlarged heart. Similar signs of pulmonary compression were observed over the right, middle and upper lobes anteriorly in a recent case, suffering from dilatation and pericardial effusion. Apparently a change in direction of pressure exerted on the lung by the distended pericardium was followed by corresponding change in location of the evidence of pulmonary pressure. These signs persisted with the cardiac enlargement, and disappeared only when the heart and pericardium had returned nearly to their normal state. Such evidences of lung compression from pericardial effusion are not uncommonly seen in adults, but the signs are less intense than when observed in children, and are usually over a lower lobe. This is the first time that they have been noted by us as occurring in the anterior portions of the lung. In these 2 cases the striking physical signs were not referable to the primary heart condition as much as to the pulmonary lesion secondary to it. Such physical signs are frequent and pronounced in heart disease in childhood, and are difficult of explanation except by analogy. Similarly, dullness or dull tympany and sharp bronchial breathing and voice are found over pleuritic effusion in childhood, when that

effusion is in sufficient quantity to exert pressure on the adjacent lung and produce tension in the thin chest wall. These physical signs are striking in contrast to the usual evidence of pleuritic effusion in the adult, and are in causation comparable to the results of cardiac enlargement under discussion.

THE BLOOD.—The interpretation of evidence obtained from examination of the blood in childhood differs little from that in adults. The leukocyte count is a little higher in the former, normally ranging from 10 to 12,000. As is true of temperature variations, so the range of variation in white cell count is likely to be greater than in adults from the same cause. This is particularly true of the leukopenia accompanying depleted, lowered resistance. In addition to the relative polynuclear increase, observed in starvation in adults, there is an absolute increase in the white cells in children in this condition. The observations of Mitchell have recently demonstrated that in bottle fed infants there may be a slight leukocyte increase immediately following ingestion of food, but that in $\frac{1}{2}$ an hour to 2 hours after feeding, there is, in the majority of instances, a distinct leukopenia. The explanation of this apparent contradiction of the previously accepted digestive leukocytosis is that there is probably a diminution of the white cells in the superficial circulation due in part to the activity of the digestive organs, and in part to the chilling of the surface of that part from which the blood is taken, rather than an actual reduction of the white blood cells. Up to the fifth year there is normally a predominance of lymphocytes over polynuclears, the normal adult ratio of 70 to 30 being reversed.

The hemoglobin content of the blood is highest at birth, being 20 to 24 grams per 100 c.c.; minimum at 5 months, 10 to 14 grams per 100 c.c.; at 2 years, 11 to 13 grams per 100 c.c., and gradually rising to the adult normal of 18 grams to the 100 c.c. at 16 years. As all hemoglobinometers are calibrated to this adult standard, an allowance for age is necessary if one is to avoid classifying as anemic many children whose blood is actually normal. A direct reading of 60 per cent. hemoglobin in a child of 2 years corrected would indicate the true hemoglobin as nearer 90 per cent. than 60 per cent., whereas uncorrected, would erroneously indicate a moderate anemia.

Since 1914 the superior longitudinal sinus has been more and more constantly employed as a site for obtaining blood for ex-

amination or for intravenous medication. The sinus may be more easily reached through the anterior fontanel than the small superficial vein through the skin and abundant subcutaneous fat, and with less discomfort to the patient. There has been no report of injury following this procedure, and in several instances autopsy on cases previously subjected to it have shown no damage to the brain or extravasation of blood, even when, through too deep penetration of the needle both walls of the sinus have been transfixed. This procedure may be followed up to the time of complete bony closure of the fontanel.

LUNGS.—Certain structural differences peculiar to youth affect the physical signs of the chest, such as the thin elastic chest wall, and the relatively larger space occupied by the bronchial tree. Breathing is louder, expiration more nearly equal to inspiration, and make an impression more approaching bronchovesicular in quality in children than in adults, giving rise to the term "puerile breathing." Such differences in percussion and auscultation as are peculiar to certain areas of the chest due to physiological causes, become correspondingly exaggerated. Relative dullness is normal to the right apex because of the arrangement of the underlying bronchus; the same is true over the right lower lobe, because of the underlying liver. In both regions the difference is greater in children, for the reasons given above. The intensified breath sounds, normally heard at the right apex anteriorly in the adult, are so much more marked in children as to make this a difficult area in which to interpret uncertain physical signs. Doubt as to the existence of a lesion at the right apex often times may be cleared up by comparison of the physical signs here and in the axilla, as in the latter location the physiological conditions affecting the signs anteriorly do not obtain, while a pathological lesion of the apex of the lung should produce much the same symptoms in the axilla, anteriorly or posteriorly. Because of the delicacy of the alveoli, emphysema occurs often in children, develops very rapidly, and may be only of short duration. Regularity of the respiratory rhythm is usually not well developed until after the second year.

Illustrating the above points and the errors in diagnosis possible in the interpretation of physical signs of the chest in children is the case of a child of 18 months, sick for 3 days with cough, temperature 101° to 103°, following a head cold. The child was

restless and constantly crying hard; his respirations were 35, and markedly irregular; percussion was hyperresonant throughout, except for the right apex anteriorly where the resonance was distinctly impaired, the breathing high pitched, exaggerated with a slightly bronchovesicular element. The diagnosis made was early bronchopneumonia involving the right upper lobe. As both breathing and voice were normal in the apex of the axilla, it seemed possible that the irregularity of respiration was simply that of age, the signs at the right apex physiological rather than pathological, the hyperresonance due to long crying, and that another cause must be sought to explain the condition. Aside from the cold in the head there had been no symptoms suggesting involvement of the middle ear, but routine examination demonstrated a bulging right drum, incision of which promptly terminated all symptoms. From the adult standpoint the physical signs justified a tentative diagnosis of pneumonia; the error lay in failure to allow for the influence of the child's age on these physical signs.

Regarding the evidences of involvement of the middle ear in children, the only one of any importance is the presence on inspection of changes in the ear drum. This inspection should, of course, be a part of every routine examination. Although the external auditory canal is small, the drum is relatively large in children. It does not lie at right angles to the line of vision as in adults, but faces sharply downward and forward. So it is possible to mistake this normal position for a bulging or displaced drum, especially if there is dulling of the surface epithelium due to congestion. An early and common sign of mastoid involvement is the drooping of the posterior and superior wall of the auditory canal, just external to the attachment of the membrana tympani. This is more to be depended upon than mastoid tenderness, because objective evidence is more definite than subjective in children, and localization of pain uncertain. This sign is peculiar to children, because the thinness of the bony plate separating the antrum from the external auditory canal allows of prompt edema and swelling of the periosteum overlying it. Similarly the frequency with which subperiosteal post-auricular abscess is found in children seems to be due, up to the end of the first year, to a somewhat analogous condition, the open Ravinian segment, which constitutes the posterior third of the bony tym-

panic ring, through which pus from the middle ear may easily find its way, and during the second year to the patency of the squamomastoidal suture, which, passing through the antrum wall and across the post-auricular surface of the temporal bone, provides an easy route for the extension of infection.

More attention is being paid now than formerly to the overgrowth of lymphoid tissue at the base of the tongue. In children this is almost as often a cause of susceptibility to infection in the upper respiratory tract, embarrassed breathing, and particularly of persistent cough, as are the faucial tonsils and adenoids themselves.

The diagnosis of acidosis is so commonly made solely on the presence of acetone bodies in the urine, that some reference to this symptom is necessary. These bodies are normally present in the urine of infants to the amount of 1 to 7 milligrams per kilo of body weight. They may occur in sick children in much larger quantity, but are usually of no particular significance, because it requires their presence in considerable excess to impoverish the alkali reserve of the body fluids to the point of producing true acidosis. So their increased production or decreased oxidation in children is often of no clinical importance. There are several explanations of this early and marked urinary symptom in children, which may be noted without danger of going too deeply into a most complicated part of body chemistry.

On slight provocation children turn promptly to the oxidation of stored fats, and if this fat metabolism or oxidation is faulty, production of acetone bodies results. Such metabolism may be faulty because of the lack of sufficient carbohydrates to provide for complete oxidation of the fats. The evidences of this error in oxidation are hastened and enhanced in conditions of circulatory depression through the capillary dilatation commonly produced by bacterial toxemias or intestinal intoxications, as a result of which the active circulating blood volume is reduced with resultant suboxidation of all the tissues. It is interesting in connection with this theory of the reduced oxidizing power of the blood to note that acetone is present many times more frequently as an accompaniment of respiratory disease than in affections of other types. Partial starvation may occur in many obscure infections with all its promptly appearing train of secondary symp-

toms, so that acetonuria often receives unwarranted attention, while the actual cause of the illness goes undetected.

REFLEXES.—In addition to lesions of the pyramidal tracts commonly causing changes in the superficial reflexes, the pyramidal tract in the child is subject to functional affections on account of its imperfect development, incomplete myelinization, and low cortical control. Kernig's sign, almost universally present in normal man, is for this reason of small significance as a fine test. The child, however, is less sensitive to this stretching of the posterior nerve roots, and the dural protrusions which follow them from the cord, and his muscles are less stiff. He sucks his toe almost as comfortably as his thumb. Kernig's sign is therefore important when present as evidence of meningeal irritation. Conversely Babinski's sign is normal to children until locomotion becomes established, and is of questionable value during the first years of life.

CONVULSIONS.—Convulsion is a symptom common to many of the ills of childhood. Because of the imperfect development of the central nervous system as a whole, efferent and afferent tracts alike, convulsions are less common during the first 4 months than during the remainder of the first 2 years. This coincides with the infrequency with which tetany is observed and the low electrical irritability of normal children during this period.

Convulsions become more common when the motor neurons with their efferent tracts, and the lower centers, such as the splanchnics, are further matured, but are as yet ungoverned by the still later developing nervous mechanism of coördination and control. Thus it is that a brain lesion, occurring in the first month, may not at once give symptoms referable to the central nervous system, and later only such symptoms as are indirect and easily referable to other secondary causes; for instance, evidences of disturbed digestion. In connection with these facts one condition in particular is to be emphasized; that is, the frequency of cerebral hemorrhage occurring at birth or soon after, causing no brain symptoms at that time, and later such symptoms as are more indicative of toxic intestinal absorption than cortical lesion. Cerebral lesion and intestinal toxemia may with equal frequency be the cause of convulsive seizures. Thus a history of spasm in the early stages of a period of nutritional disorder should bring up the question as to whether it refers to an early obscure cerebral

lesion, such as birth hemorrhage, or is merely a part of the evidence of intestinal toxemia.

A child of 6 months, weighing the same as at birth, with a history of moderate convulsive attacks occurring shortly after a change from nursing to artificial feeding at one month, and who from this time on has shown no symptoms other than the general one of asthenia and malnutrition, is usually looked upon as a purely nutritional problem, with the convulsions digestive in origin. Many such, after weeks of fruitless effort to find a successful dietetic scheme, terminate fatally without symptoms definite enough either to guide us in our dietetic measures, or explain the severity of the condition. Such is the history of an actual case, and if uncommon at all, it is only so in that autopsy was obtainable to make certain the diagnosis of cerebral hemorrhage, probably occurring at birth.

CASE REPORT.—A 4th child, the others normal, no miscarriages, *labor easy and normal*. The child was normal at birth, and weighed 7 pounds, 6 ounces.

She nursed entirely for 4 weeks, and at the end of that time was put on part feedings of dry milk. Three days later an attack of twitching occurred on the right side. On the following morning twitching was observed on the left side. This lasted for some little time, becoming more pronounced in the middle of the day, and almost continuous throughout the afternoon. These attacks of twitching recurred off and on for 2 days, during which time there was constipation, vomiting and later diarrhea.

During the next 4 months, various formulae were tried with varying success. At 7 months of age, she weighed 8 pounds. Physical examination at this time revealed a small, badly nourished child, with general hypertonus and rather marked rigidity of the neck. The skull development was good and the anterior fontanel was open 2 x 2 c.m. The posterior fontanel was closed. All the reflexes were exaggerated, no *tâche*, and there was marked retraction of the head. The epitrochlears on both sides were markedly enlarged, but there was no other glandular enlargement. The baby had all the distinctive muscular rigidities of undernourishment, without anything definitely referable to the central nervous system. She was taking the food well, but was not gaining in strength or weight. On July 25

she was admitted to the New York Nursery and Child's Hospital in a state of collapse, and died almost immediately after admission.

Autopsy Findings.—Body is that of a white female child 7 months old, markedly emaciated, rigor mortis passed off. The abdomen is scaphoid. Eyes and cheeks are sunken in. Fontanel depressed. The cornea are clear. Median section—panniculus—presents markedly atrophied fat. The peritoneum has lost some of its luster—somewhat dry and presents a diffuse engorgement of vessels. The abdominal cavity contains about 15 c.c. of serous fluid with a large amount of flaked fibrin. This engorgement is only present in the peritoneum and does not extend into the underlying tissues. Intestines are distended with gas.

Brain—500 grams. Rather pale and on serial sections presents bi-lateral organized old hemorrhages. These lie about two-thirds back of the frontal lobes. They lie embedded in the corpus striatum for the most part, involving the caudate nuclei surrounding the internal capsules, but not involving them to any extent. They measure 1 by $1\frac{1}{2}$ cm. and are extremely firm in consistency. They are a light rusty color, streambed with white fibrous strands. There is no evidence of any injury or any thrombosis of the striate branches of the middle cerebral vessels. The old masses are undoubtedly organized hemorrhages of long standing.

Heart—15 grams. Extremely pale, firm and of a glassy appearance. Otherwise negative.

Lungs—Together 80 grams. Present hypostatic congestion and several subpleural extravasations.

Liver—100 grams. Dark brown color. Extremely firm and of a dry leathery consistency.

Spleen—8 grams. Dark red. Firm, dry, leathery consistency.

Thymus—Atrophy.

Pancreas—Negative.

Stomach and Intestines—Extremely thin. Present marked atrophy of mucous lining.

Kidneys—15 grams. Negative.

Anatomical Diagnosis—Old organized bi-lateral cerebral hemorrhage of the corpora striata; hypostatic congestion of lungs; dehydration of viscera and early inflammation of peritoneum.

This is illustrative of a large group of so-called unsatisfactory feeding cases in which the question is whether the malnutrition and asthenia are of central or digestive origin. The answer in these cases is not found in an analysis of the spinal fluid, nor in the observation of the digestive condition, but only in the ultimate finding of definite evidence of brain injury, which has occurred silently, but has gone on to disturb the entire physical balance, without definite clinical symptoms.

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HEREDITARY SYPHILIS CAUSE OF MEMBRANOUS PERIENTERITIS (Surgery, Gynecology and Obstetrics, August, 1920). Hereditary syphilis is regarded by Castex and del Valle as being a very frequent cause—perhaps the most frequent—of membranous perienteritis and analogous conditions. Its pathogenesis is complex as several factors operate, which in chronological order are: defects of conformation in the intestinal walls because of the faulty endocrine function which presides over and governs their development. These malformations on the one hand, and the abnormal function of the nervous system (sympathetic and autonomous), owing to the endocrine deficiencies, produce defects in the gastrointestinal statics and dynamics. As a consequence of the latter we have intestinal stasis which brings on chronic inflammation of the colon. From the wall of the colon the inflammation spreads to the surrounding serous membrane, aggravating the existing congenital lesions. The primary cause of all this is hereditary syphilitic infection, generally in the form of a late manifestation. These patients, first of all, should be given mixed antisiphilitic treatment with mercury chiefly. The surgical treatment is not to be abandoned, but is to be restricted to cases in which definite indications, confirmed by clinical and radiologic diagnoses, point to mechanical alterations of importance (kinks, adhesions, etc.); or to coexisting inflammatory lesions of adjacent organs: ovaries, tubes, appendix, gallbladder, duodenum, and stomach. Surgical treatment should consist in separating membranes and in molding and mobilizing the peritoneum, together with careful peritonization and removal of the adjacent affected organs.—*Journal A. M. A.*

REPORT OF A CASE OF DIAPHRAGMATIC HERNIA.

BY JOHN E. GREIWE, M.D.,

Cincinnati.

It seems desirable to present this case not only because of the rarity of the condition, but especially because of the evidently unique etiologic factor.

A. V., a girl $5\frac{1}{2}$ years old, was brought to me by Dr. R. Lee Bird, of Latonia, Kentucky. The history of her present illness, in a sense, preceded her birth, inasmuch as the mother, at the time of delivery and immediately thereafter, was seriously ill from whooping cough. The child, despite severe paroxysms of cough on the part of the mother, was carried to term, and is said to have weighed 4 pounds when born. It may be added that, besides the mother, 2 other children in the family had pertussis at the same time.

Immediately after birth the child was seized with severe attacks of coughing which continued to the fifth year. From the very beginning, vomiting was a pronounced feature, occurring at various times and bearing no special relationship to the character of the food or to the time of feeding. In fact, a liquid diet had been almost exclusively adopted, since even the most readily digested foods—milk, Mellin's, broths, etc.—were not completely retained for any considerable length of time. Solids were not given because even water was rejected by the stomach. The child was physically depressed and evidently retained just enough food barely to sustain life. At the age of $5\frac{1}{2}$ years the weight was 28 pounds. Constipation was a marked feature. Effort and excitement invariably brought on an attack of vomiting; a few days before the first consultation the vomited material had what the parents described as a fecal odor.

The physical examination revealed a child exceedingly thin, pale, poorly nourished, with badly developed musculature and practically no subcutaneous fat. The excursions of the chest were fair, with dullness amounting to flatness on percussion over the lower portion of the right chest. This area of dullness shifted with the position of the patient. The apex of the heart, on auscultation, was found to the left of the sternum about midway between the left margin of the sternum and the mid-clavicu-

lar line in the fourth interspace on the left side. Over the lower portion of the chest, the heart tones were very clear and without murmurs. The respiratory sounds were good, except over the lower portion of the right chest. On the day before operation, gurgling was present over the lower part of the left chest. The abdomen was flat and the abdominal walls were practically without fat tissue. The urine showed neither albumin, sugar, casts nor acetone.

The history of the case would lead one to suspect a partial obstruction at the pylorus. The X-ray examinations, however, which were made by Dr. J. R. Cooper, revealed the fact that the stomach was not in the abdominal cavity, but well within the left side of the thorax. The pylorus and the antrum were below the diaphragm, and the diaphragm was causing the obstruction.

With the X-ray (Plate I), the diaphragm could be seen on the right side; fluid was found in small amount in the right pleural sac, and the heart was somewhat tilted from its normal position to the right. On subsequent examinations it was noticed that the position of the heart varied with the fullness of the stomach. A curious feature was the condition of the diaphragm on the left side. Here no well-defined line could be noticed and it was a question in the first examination whether or not there was a partial absence of the diaphragm on the left side. There was also some question as to whether or not the colon, because of its high position, might not be within the left thoracic cavity. Further X-ray examination (Plate II), however, more particularly stereoscopic pictures, revealed the presence of the left side of the diaphragm, as well as the colon within the abdominal cavity.

Briefly, then, we were dealing with a case of diaphragmatic hernia, with a history of severe paroxysmal cough (whooping cough), which developed immediately after birth.

Hernia, with stomach, colon and parts of the small intestine within the thorax, while not common, nevertheless has been the subject of surgical procedures. Congenital absence of the diaphragm is a known pathological condition. Hernias, the result of injuries by falling, by blows upon the abdomen, stab wounds of the diaphragm, etc., are very often seen; hernias, developing years after a stab wound, have been recorded, but so far as I am able to ascertain, there is no case on record in which, so

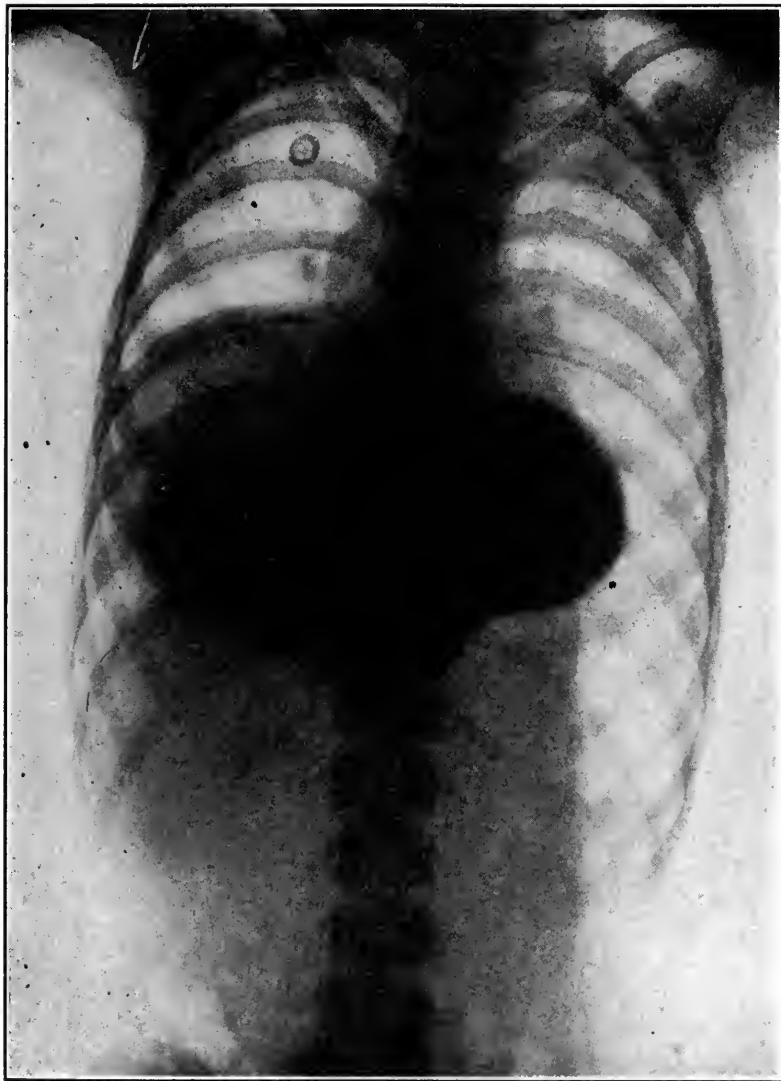


PLATE I—Roentgenogram taken at first examination. The stomach in a horizontal position, occupying lower portion of thorax. The pylorus, covering two-thirds of heart shadow, is above the diaphragm on the right side. On the left, the diaphragm cannot be made out. This picture suggests an absence of the left half of the diaphragm.



PLATE II—Taken 1 hour after Plate I. The stomach has changed its position. The pyloric end is directed downward, in the manner of a protrusion through an orifice,—evidently the pylorus passing through the hernial opening in the mid-line of the diaphragm into the abdomen. The shadow above the diaphragm on the right is due to fluid in the right pleural sac. A very small amount of barium has passed into the intestines and is in the lower left iliac region.



PLATE III—Taken 6 months after operation. The stomach is wholly within the abdomen and the diaphragm is apparent on both the right and left sides.

early in life, hernia has developed as the result of damage to the diaphragm, due to violent attacks of coughing. It is, of course, not possible to say that the rupture of the diaphragm occurred immediately after the first paroxysms. The coughing persisted for the first 5 years, but the vomiting continued up to the time of the operation.

The operation was successfully done by the abdominal route by Dr. Otto Seibert, who has submitted the following transcript of his procedure:

"Operative Procedure, Augusta V., April 12, 1918.—Median incision, extending from the ensiform to just above the umbilicus. Careful exploration confirmed pre-operative diagnosis. The entire stomach was found in the post-mediastinum behind the heart. There were no adhesions of the stomach to the ring. There was an opening in the diaphragm from 2 to 2½ inches in diameter, appearing to be the esophageal opening much enlarged. The stomach was withdrawn from the chest cavity with difficulty, as with each inspiration the negative pressure pulled it back through the opening in the diaphragm. Not until after firmly securing the stomach with stomach clamps was I able to pass sutures to close the diaphragmatic opening. Three heavy chromic gut sutures were passed through the margin and tied so as almost entirely to close the opening, leaving just enough room for the esophagus to pass. The anterior stomach wall was fixed to the abdominal wall by means of 2 chromic gut sutures passed through the serous coat of the stomach and through the peritoneal and muscular layers of the abdominal wall. The abdomen was closed in the usual manner. About the seventh day after operation the entire abdominal incision fell open from end to end. This necessitated a second complete closure. Convalescence thereafter was uneventful. The patient began immediately to take nourishment in moderate quantities and, before leaving the hospital, was enjoying practically a full diet. In reporting a case of this kind before the Cincinnati Academy of Medicine, 2 years ago, I suggested that, if occasion again presented itself, I should use the reverse Trendelenburg position to make the field more accessible, and thus facilitate the operation. In this case I tried this position, but the child took the anesthetic so poorly that we had to place her back in the prone position."

The patient's weight increased satisfactorily within 6 months

after the operation, her weight at this time being 43 pounds. She is attending school, is bright and happy, retains her food and is perfectly well. X-ray (Plate III), taken 6 months after the operation, shows the stomach in the abdominal cavity and the rent in the diaphragm closed.

In conclusion, it may be added that we were dealing, not with a hernia resulting from a congenital diaphragmatic defect, usually inoperable because of its size, but with a diaphragmatic hernia of the stomach, caused by the rupture of the diaphragm during the paroxysms of whooping cough.

The X-ray examinations were made by Dr. J. R. Cooper, who has kindly furnished the photographs and supplied the legends.

1801 Union Central Building.

INJECTIONS OF PATIENT'S OWN MILK TO STIMULATE SECRETION (*Zentralblatt für Gynäkologie*, June 5, 1920). Meyer reports the results of the injection of the woman's own milk in twenty women after childbirth. In two cases no effect was noted; in six cases the effect was weakly positive; twice it was impossible to decide whether the increased milk flow was due to the injections or to other causes, but in sixteen cases, or 61.5 per cent., in from twelve to thirty-six hours after the subcutaneous injection of from 1.5 to 3 c.c. of the woman's milk a distinct increase of the milk secretion was noted, but as a rule the increase lasted only a few days, when the flow fell off again. The effect in most cases followed so soon after the injection that doubts as to the causal connection seem unwarranted. Sometimes the patients were not informed as to the nature of the injections, and in many cases the increased amount of milk following the injection was more than double that of the preceding day. Lönne reports two cases among others in which the injections several weeks after childbirth seemed to afford the needed stimulus for the deficient secretion, the women thereafter having abundance of milk.—*Journal A. M. A.*

LAMBOTTE-HANDLEY DRAINAGE IN A CASE OF CHYLOUS ASCITES (SECOND REPORT)

By FRANCIS HUBER, M.D.

Consulting Physician to Gouverneur Hospital; Consulting Pediatrician to The Jewish Hospital of Brooklyn; Chief of Pediatrics, Beth Moses Hospital of Brooklyn; Attending Physician to The Broad Street Hospital, New York.

In the Journal of the A.M.A., (November 8, 1919, page 1427) an abstract is given of an article on "Autodrainage of Ascites &c.," taken from the *Correspondenz-Blatt fuer Schweizer Aerzte*, September 11, 1919. The author, Dr. Schirmer, reports the later outcome of the case of ascites in which Tavel, in 1910, drained the fluid into the subcutaneous tissues of the abdominal wall, using a glass spool to keep the opening patent. No other case of the kind of such long continued success, is on record. The ascites was of the "premenstrual type," the patient a girl 13 years of age. The fluid thus drained into the connective tissue was readily absorbed in the beginning, later, however, large water cushions formed in the groins, sagging down and overlapping the thighs. The operation caused a marked improvement in the general health: in time the benefits were counterbalanced by the discomfort and deformity caused by these irregular and large collections of fluid in the abdominal walls. Subsequently they became encysted and as no further absorption took place, grew larger and more tense necessitating repeated tapping at longer or shorter intervals.* The spool, which had become loose, had fortunately escaped into one of the pouches and had been removed several years ago. The "water bags" were finally removed by Henschel in 1918. The operation, difficult and tedious on account of the matting together of the structures by newly formed dense fibrous tissue, revealed a large aperture about the size of a 50 cent piece in the thickened peritoneum at the site where the glass spool had been inserted originally. There was free communication between the peritoneal cavity and the multiple, irregular, extensive, and freely intercommunicating cyst-like pouches lined with a thick smooth glistening serous membrane resembling peritoneum. The peritoneal opening (resembling the neck of an umbilical hernia) was then closed and the necessary tedious surgical measures to resect

*The two illustrations in the original article show the extent and character of the deformity and the cosmetic success after operation.

the numerous sacs were carried out successfully. Though the deformity was relieved, the ascites persisted, in spite of all that had been done, medically and surgically.

The above reported experience induces me to give the subsequent history of a case of "acute chylous ascites" treated by auto-drainage with strands of silk. The case is reported in detail in the "American Journal of Diseases of Children," July, 1914. In brief, the history is as follows: Male, age 8 years, has never been out of New York, parents Russian Polish. With the exception of measles at 4, and pneumonia at 5½, he enjoyed fair health up to within 2 weeks prior to his admission to the hospital on December 15, 1913. Though afflicted with a severe nasal discharge, he nevertheless attended school, feeling sick generally. Two days before, while undressing, the father noticed the swelling of the abdomen and genitals. No fever, headache, urinary disturbance or general depression noticed.

On admission marked edema of penis, slight edema of the upper part of both thighs, abdominal walls and back, none about the ankles or feet. The abdomen was greatly distended with fluid. Urine, blood, von Pirquet and Wassermann negative. The general condition was fair, appetite "simply enormous," bowels regular.

As there was no improvement under medical treatment, the abdomen was tapped and over 3,000 c.c. of a slightly turbid, milky fluid were removed. Considerable oozing occurred through the puncture and continued for several days. Eleven days later, 2000 c.c. were drawn off. The fluid recurring so quickly, more radical measures were indicated and after consultation with my surgical colleague, Dr. Henry M. Silver, an exploratory laparotomy was decided upon; first, to ascertain the cause* and, secondly, to drain the "peritoneal pond" into the subcutaneous tissues of the upper thighs and the anterior abdominal wall, thereby conserving a fluid rich in proteins, salts and the other characteristic constituents of the body fluids. The exploratory laparotomy was carried out by Dr. Silver a few days later. The abdomen was opened

*The indefinite history, and a painstaking consideration of the points brought out in the physical examination of the patient, failed to throw any light upon the etiology. No history of trauma was elicited, the blood did not reveal any filaria, nor did the boy present any evidence of tubercular glands, Hodgkin's Disease or a possible malignant affection. The rapid onset of the ascites and the equally rapid recurrence of the milky fluid after tapping, the large prominent veins over the abdomen, the local edema of the back, abdomen and genitals, pointed to some intraabdominal condition interfering with the chylous circulation.

and explored through a 3 inch incision downwards, beginning about the level and a little to the right of the umbilicus. Considerable fluid escaped and more than 1500 c.c. were drawn off by a suction apparatus. The small intestines were pale and distended with gas. The lacteals, not only in the intestines but in the mesentery, were greatly distended and were prominent, flexuous in their course, constricted in places, and presenting a beaded or varicose appearance. The constrictions on the intestines were so tight in spots, that the lacteals would disappear only to reappear in the mesentery. Isolated lymphatic glands, much enlarged, were present, small near the gut, growing larger and more numerous towards the mesentery roots. Some were the size of a small hickory nut, soft, elastic and of a yellowish color. No tubercular peritonitis or other abnormality, as far as could be made out through the 3 inch incision, was discernible. The child's condition not being very good, it was not deemed advisable to remove a gland for a more careful study. There was evidently, though not discovered, some obstruction higher up in the lymphatic circulation, consequently some simple, rapidly carried out form of drainage, was indicated. The Lambotte-Handley plan was adopted. Six strands of No. 7 white silk, 4 inches long, were caught in the grasp of a narrow blade dressing forceps, carried into the abdomen and thrust through the peritoneum to the outer side of the femoral vessels, into the cellular tissue of the thigh, only half inch of the silk remaining within the peritoneal cavity. This was repeated on the opposite side. At the upper angle of the wound, a similar procedure was adopted, the silk being introduced into the tissues above the umbilicus, the lower half inch projecting into the peritoneal cavity. Great care was observed to allow only a little of the silk to project, for carefully conducted experiments have shown that long strands may cause intestinal obstruction by forming attachments to the omentum or other intra-abdominal structures.

The convalescence was rapid and uneventful. At the end of a week, upon the removal of the dressings, the wound had healed completely without any edema or infiltration about the edges. Some edema persisted in the upper portion of the right thigh, very little in the left and none over the upper abdomen. He was discharged in fine condition, every trace of edema gone, the latter part of March. The appetite, which prior to operation, had

been "enormous" became normal. Five months later a careful examination failed to show any abnormality, the abdomen was lax, no mass or thickening anywhere over the areas where the silk had been introduced.

The patient has continued to enjoy good health since and at the present time (March, 1920), more than 6 years after the operation, is a bright, active, well developed lad, height, 4 feet, 11 inches; weight, 97½ pounds.

I have seen but one other instance about 18 years ago. In this case the ascites was but a part of the general water-logged state. The boy had, in addition, large glandular swellings in the neck. The urine contained albumin and casts in abundance. Upon tapping the abdomen, a large quantity of a lactescent fluid was removed. The ascites reappearing quickly, he was tapped several times. In the hope of relieving the pressure, the group of glands about the neck were removed. In spite of the radical work, they recurred within a few months. Decapsulation of both kidneys failed to give more than temporary relief. The subsequent outcome is not known as the boy was taken home and passed from observation. Longcope (Osler's Modern Medicine), discussing Hodgkin's Disease, says, "with enlargement of the bronchial and mediastinal glands, effusion into the pleural sacs occurs in a certain number of instances. This is usually seen only late in the disease. The fluid is most often serous, although chylous fluids are mentioned. Edsall has described in one case a curious type of milky, albuminous effusion into the pleura which at first sight appeared to be chylous in character."

Remarks. Schirmer's contribution is of extreme interest and will repay a careful perusal. It teaches the danger of using a glass drain, which loosening up and becoming displaced, does not become encysted, but must be removed as a foreign body. We find that the immediate results were satisfactory. That is to say (we may justly infer) as long as the fluid escaped slowly into the connective tissues through the lumen of the glass drain. Unfortunately, as subsequent events proved, the drain gradually became loose and the peritoneal opening proportionally increased in size, thus allowing more fluid to enter the tissues than could be disposed of by the absorbents. In consequence of which, a proliferation of the connective tissue occurred, resulting in an irregular walling off of the extruded fluid in the abdominal wall.

Furthermore, the original cause of the ascites was still active. A close inspection of the open abdomen by Henschel failed to reveal the exact nature of the process.

The ultimate failure in Tavel's case is readily explained. Too much fluid under pressure escaped through too large an opening into the tissues . . . more than could be taken care of by the lymphatics. Handley says, "if the absorptive power of the tissues are normal, and the amount of the fluid led into them is not excessive the appearance of edema is not to be expected."

Schirmer, upon a careful consideration of the subject, is of the belief that the conditions for absorption in the retroperitoneal and lumbar regions are more promising, pointing out further, that the fluid might find its way from here down into the legs, thus providing a larger area for absorption. He favors the use of "calf aorta" hardened in formaldehyde for drainage as the drain would heal in situ, become organized without being obstructed and, moreover, would not act as a foreign body.

In the opinion of the writer, the increased difficulties of the posterior operation, the disadvantages of a large aperture in the peritoneum and the possible dangers of a hernia, are practical points that must be kept in mind. The anterior operation using sterile silk as drains, is relatively simple and easy of execution. The Lambotte-Handley method allows the fluid to enter the tissues slowly and continuously, permitting ready absorption. The tissues are not flooded with excessive amounts under too great a vis-a-tergo. We may compare the action to that of the "Murphy Drip," slow delivery and ready absorption. The final results in our case, notwithstanding the rapid recurrence of the fluid after the 2 tapplings prior to the radical operation, were not only gratifying but were permanent. The plan is not adapted to all cases of ascites. Those due to malignant disease, or inoperable tumors, renal affections, heart troubles, or rapidly progressing hepatic disorders, cases in which the fluid recurs quickly after tapping, are not benefitted by the procedure.

In conclusion, a word as to the final changes taking place in the silk drain, is in order. McDill's experiments (using silk strands as drains upon animals) show the short intraabdominal ends enveloped with a densely organized membrane outside the silk and a general infiltration of the meshes by cells, single, in bundles and in septa. Although the angle of the silk with the

peritoneum is plainly marked, showing an actual ectropium of the serous membrane along side the silk, the latter really acts as a silk connective tissue plug. This angle is the place at which McDill claims, an intraperitoneal fluid must find its exit by pressure and gravity to the subcutaneous lymph spaces, along the outside of and not within the body of the silk.

ADDENDA

In the early part of May, 1920, the patient presented himself for examination. For some weeks he had experienced a sense of weight in his legs, and became easily tired, though he did not appear to suffer in his general health. The left leg was more swollen than the right, and an undue fullness was observed in either inguinal region. There was a slight amount of fluid in the left tunica vaginalis, no ascites, Wassermann negative, nothing abnormal in the blood or urine. No valvular trouble present.

A careful x-ray examination of the chest and abdomen, made by Dr. Savage at the Broad St. Hospital, failed to reveal anything abnormal in the lungs. No enlarged bronchial, mediastinal, or retroperitoneal glands could be detected. The cervical, axillary and inguinal glands were moderately enlarged (not suggestive however of Hodgkin's Disease).

Under rest, tonics and gentle massage of the lower extremities, some improvement took place. At present, October 10, 1920, the hydrocele has disappeared, the edema of the right leg is very much less, there is still considerable edema of the left leg and thigh. The fullness in the inguinal region is still present.

The new recurrence of the ascites justifies the inference that the drains are still effective. As there is no evidence of any lesion in the heart or kidneys, profound anemia or other cause to explain the rather solid edema, the fault must lie in the absorbents. The subject has been very carefully studied by Henschen (see original article).

The case is still under observation. Should the edema continue rebellious to treatment, or the patient be greatly inconvenienced, further surgical methods may be resorted to, as incision or excision of large strips of the fascia lata, to favor absorption of the fluids by the deeper lymphatics.

209 E. 17th Street.

AN UNUSUAL. INSTANCE OF MULTIPLE INFECTIONS.*

BY ARCHIBALD L. HOYNE, M.D.,

Chicago.

A report of this case is made for 2 reasons: first, because of the exceptional combination of circumstances relating to it; second, on account of the manner in which it emphasizes the necessity for caution in admitting patients to a contagious disease hospital if crossed infections are to be avoided.

Before setting forth the report, it should be stated that the Municipal Contagious Disease Hospital of Chicago is built according to the cubicle system. This is the true cubicle system with glass partitions 7 feet high and the same air circulating over the heads of all patients. I have said *true* cubicle system, because of the frequency with which this term is applied to hospitals wherein the construction allows for isolation in small wards or individual rooms with 4 complete walls extending to the ceiling.

Cases of measles or chickenpox are not received in our cubicles, but are isolated on the top floor of the building in separate rooms. The purpose for this is two-fold: (1) we are confident that measles and chickenpox, in contrast to such diseases, as scarlet fever and diphtheria, are air borne to some extent at least; (2) measles may be carried by a draught from one end of a ward to another, and the tendency of the infecting organism is always to travel upward in a building. Instances of the latter have been witnessed at the Cook County Hospital, where the infection passed up a ventilating shaft from a child suffering with measles on one floor to attack a susceptible in the room immediately above. Even where there was no direct connecting link, as in the case of the ventilating flue, it has been noted that the disease traveled from a patient on one floor to a child occupying the room directly over it. The only explanation for such instances, several of which have been studied, was, since they occurred at a period of the year when windows were open, that the infection passed out of the window on one floor and in the window on the upper floor.

With the foregoing explanation it will now be apparent from

* Read before the Chicago Pediatric Society, January 13, 1920.

the following account of this case how many possibilities there were for crossed infections in the hospital had not extreme care been exercised when the patient was admitted.

Report of Case.—At 7 P. M., March 3, 1919, R. C., an exceptionally robust white boy, 7 years of age, was sent to the Municipal Hospital with a diagnosis of laryngeal diphtheria and request for intubation. The history accompanying the child stated he had been ill 5 days. Also that he had suffered from no previous disease at any time. No diphtheria antioxin had been given.

When received at the hospital the patient had a temperature of 105° F., pulse 128, respirations 30. He appeared to be extremely ill, was delirious and very croupy. The conjunctivæ were congested; the cervical glands were swollen. The tonsils were enlarged and the mucous surfaces very much inflamed, but no diphtheritic membrane was seen. The tongue was heavily coated, papillæ prominent, and the history read "strawberry tongue." The skin was hot but normal in appearance, except for the face, which looked flushed.

The diagnosis on admission was laryngeal diphtheria and scarlet fever (onset). Intubation was not considered necessary at this time, though the possibility of its being indicated later was considered, and on this account the child was isolated on the first floor, where provision for all intubated cases is made.

The patient was given 30,000 units of diphtheria antitoxin. Cultures were taken from nose and throat. The urine analysis was negative. No blood count was made.

At 9 o'clock the following morning the patient's condition showed little change. The temperature was 104° F., one degree less than on admission, pulse 128, and respirations 32. The eyes were considerably congested, and, in view of the fact that the temperature was so high and cough so marked, it seemed more than probable that this was a case of measles in the prodromal stage. (A report on the culture had not been received at this time.) A very careful inspection of the mucous membranes of the mouth failed to disclose any Koplik spots, however, and so measles was excluded from the diagnosis.

The cough was distinctly of a laryngeal type, and there was slight retraction of the supra-clavicular spaces. A diagnosis of laryngeal diphtheria was then adhered to, and, at the completion

of the examination, the report of a positive culture was received, which sustained the conclusion. No false membrane could be detected, though a laryngoscope was not used.

The skin seemed to be normal in appearance, except the face, which was still somewhat flushed. There was no real circumoral pallor, nor any rash on other portions of the body. Scarlet fever onset was suspected, but positive diagnosis not determined. On a very thorough examination, however, one solitary vesicle was disclosed on the left foot just below the external malleolus. This lesion was so absolutely typical of chickenpox that a diagnosis of that disease was then made. Accordingly the patient (14 hours after admission) was ordered transferred to the top floor for isolation as a case of diphtheria and chickenpox. Since there was already a patient with diphtheria and chickenpox isolated on that floor, it was suggested, for the sake of economy in space, that this child be placed in the same room. Nevertheless such an arrangement was not deemed advisable, so the patient was isolated separately.

At 7 P. M., March 4, just 24 hours after admission, the patient broke out with a typical measles eruption, and at 8 P. M. the temperature, which had been rising again in the afternoon, had declined to 103° F. The following morning, at 8 o'clock, temperature was 102° F., the coryza was marked and the typical maculo-papular eruption was scattered over the entire body.

On the afternoon of March 5, the third day in the hospital, temperature rose to 103° F., pulse 140, respirations 30, and a finely papular rash, with a subcuticular flush, made its appearance. This rash covered the entire body, involving the areas of normal skin which the scattered and blotchy eruption of measles had missed. The exanthem seemed to be unmistakably scarlet fever and appeared just 49 hours from time of admission.

During the next two days—March 6 and 7—the rashes were seen to be fading and there was much improvement in the boy's condition. The cough, however, continued.

On March 8, at 8 A. M., the temperature was 98.6° F., pulse 92, respirations 26. At 4 o'clock in the afternoon of this day temperature rose to 100.4° F. and a papulo-vesicular eruption appeared in groups over the chest and back, this being the fifth day since the one lone vesicle was observed on the left foot. The lesions continued to appear in crops for the next 2 days

until the eruption was profuse over the trunk, face and extremities. The temperature rose to 102° F. on March 11—the third day of the general outbreaking with chickenpox and the ninth day since entering hospital. From this time on the temperature declined, never again exceeding 99° F. during the patient's stay.

The child made a complete recovery without any complications other than those noted. There was no diphtheritic paralysis, no bronchopneumonia, no nephritis or otitis media, and no abscesses nor other infections.

The patient was in the hospital 35 days, being discharged on April 8, when desquamation was complete and 2 negative cultures on consecutive days had been obtained.

A summary of this case shows a number of erroneous deductions which led, however, to favorable action:

1. March 3, evening, patient sent to hospital for intubation.
2. Admitted as laryngeal diphtheria and scarlet fever (onset). (a) No intubation done. (b) Not placed with other diphtheria and scarlet fever patients having this double infection. (c) Isolated on first floor, owing to laryngeal condition.
3. March 4, morning: (a) Laryngeal diphtheria confirmed. (b) Measles considered but "excluded" on absence of Koplik spots. (c) Scarlet fever (onset) questioned. (d) Chickenpox diagnosed—one vesicle on foot. (e) Transferred to 4th floor as diphtheria and chickenpox. (f) Not isolated with another case of diphtheria and chickenpox. Isolation separate.
4. March 4, evening: Measles eruption appeared. March 5, evening: Scarlet fever eruption developed. March 8, evening: Chickenpox (profuse) eruption.

It will be observed from the foregoing that none of the diseases was contracted in the hospital. It may also be stated that no crossed infections resulted from this case, owing to the care with which it was handled.

25 East Washington St.

BUTTER FAT AND THE CHILD'S WEIGHT.*

By J. H. LARSON,

SECRETARY OF THE NEW YORK MILK COMMITTEE.

The data presented here consists of the graphic presentation of the weights of 10 children selected from a group of resident children at an orphans' cottage home at Rochester, N. Y. The records were obtained during the recent survey of the Rochester milk supply under the direction of Dr. Charles E. North. The weights shown were recorded at 6-month intervals during 2½ years previous to the end of 1918. The weights of 3 of the children were incomplete for this entire period, due either to the fact that they were discharged before the end of 1918, or had not been admitted by the end of 1916. It should be explained that though the cottages have a population of about 30 children, the reason for so few out of the entire group being shown is that there is constant shifting in the population through discharges and admissions, and also that weight records were not taken from the histories of any children who had been under medical treatment or for whom had been prescribed medicines or emulsions of any kind. In other words, the data presented is limited to those children who were sufficiently normal as to health and general physical condition to be considered as not needing medical supervision.

TABLE SHOWING THE WEIGHT PER CHILD FOR 5 SIX-MONTH PERIODS
ENDING DECEMBER 31, 1918.

		AGE		WEIGHT					
		12/31/16		12/31/16	7/1/17	12/30/17	6/29/18	12/27/18	
1.	Boy	13	8/12	70.75	77.5	88.	84.75	91.25	
2.	Boy	14	9/12	90.	94.	102.	100.5		
3.	Boy	8	9/12		56.	58.5	54.25	60.25	
4.	Girl	9		52.75	52.75	56.25	55.	62.5	
5.	Boy	11	3/12	54.75	54.5	60.	57.5	65.5	
6.	Girl	10	3/12	63.	67.5	73.75	71.	82.	
7.	Boy	11	2/12	70.75	77.25	79.75	78.50	82.25	
8.	Girl	16	6/12			72.	70.25	75.	
9.	Girl	14	9/12	99.50	104.25	116.5	123.	132.	
10.	Boy	11	10/12	66.	67.5	71.25	66.25	77.37	

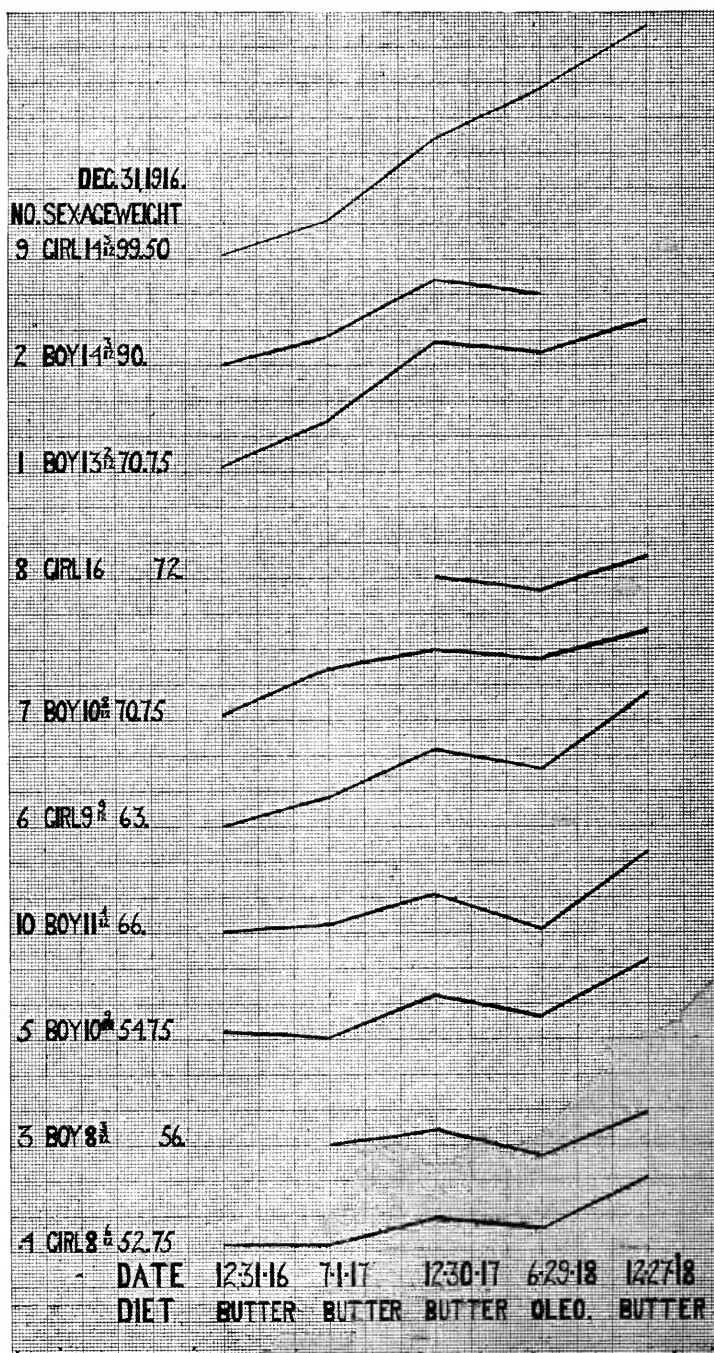
From this table it is observed that there was a gain in weight for each 6 months with the exception of the fourth 6-month period; in other words, the period between January 1 and June 30, 1918. Though he had made no effort to tabulate the weights,

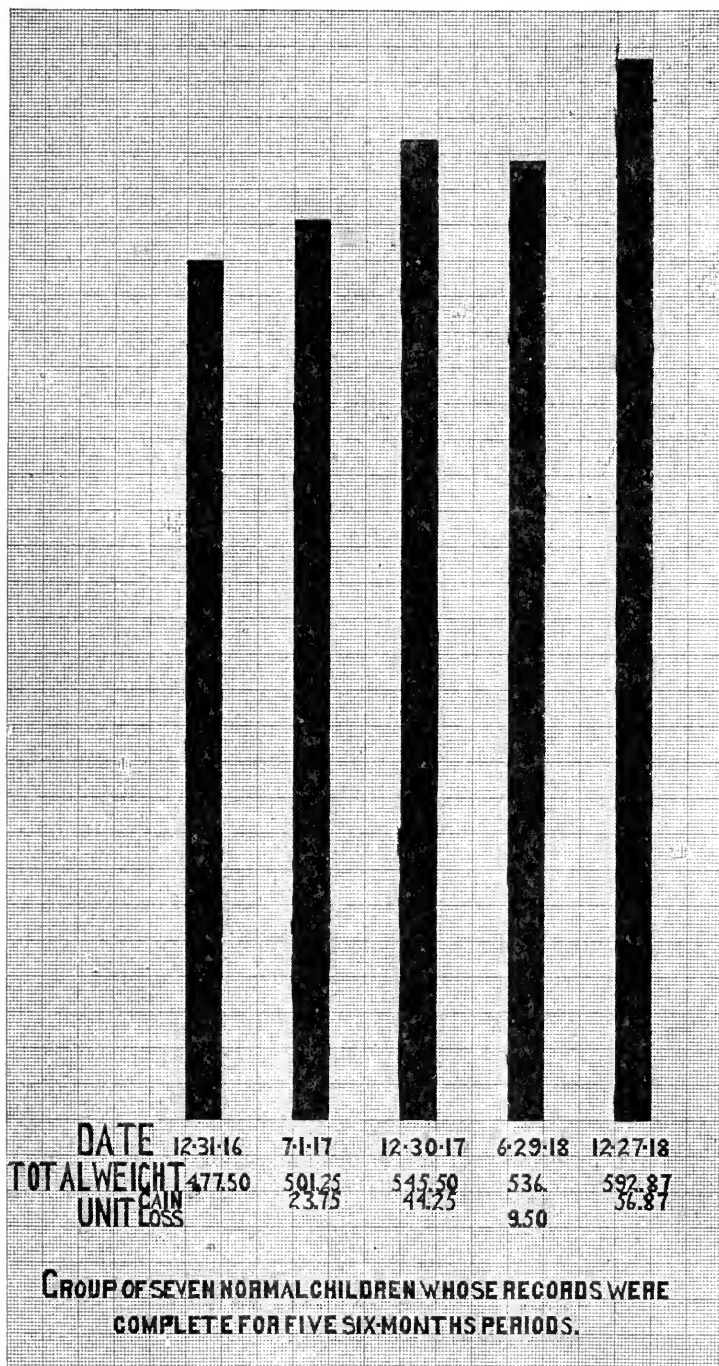
*Presented before the Section on Pediatrics, New York Academy of Medicine, December 11, 1919.

the superintendent intimated to the writer that the data might show some interest as to weight variation during the above-mentioned 6-month period. His explanation was that out of a desire of himself and his governing board to comply with the request of the Federal Government for food conservation, particularly animal fats, during the first 6 months of 1918 oleomargarine was substituted for butter in the diet of the children and the workers at this orphans' home. From the graph showing the individual weight of each child at 6-month intervals, it is seen that 9 of these 10 children lost weight during the oleomargarine period. One girl, who, by the way, is physically supernormal, that is, considerably above her weight and height for the theoretical weight and height for a girl of her age, did not lose weight during that period. It is interesting to note that her progress was slightly retarded as compared with her gain during the previous and succeeding butter periods.

The graph showing the total weights of 7 children, whose records were complete for the $2\frac{1}{2}$ years, shows that at the end of the last 6 months of 1916 they weighed $477\frac{1}{2}$ pounds. Six months later they weighed $501\frac{1}{4}$ pounds, a gain of $23\frac{3}{4}$ pounds. At the end of the next 6 months period, that ending June 30, 1917, this group of 7 weighed $545\frac{1}{2}$ pounds, a gain of $44\frac{1}{4}$ pounds over the previous 6-month period. At the end of June, 1918, which is also the end of the oleomargarine period, the group weighed 536 pounds, showing a loss in weight of $9\frac{1}{2}$ pounds. At this point oleomargarine was excluded from the diet and the feeding of butter again resumed. The weights taken at the end of December, 1918, again the end of a 6-months period, the group weighed 592.87 pounds, or a gain of 56.87 pounds over the oleomargarine 6 months period preceding. The superintendent of the home is authority for the statement that the oleomargarine fed during the first 6 months of 1918 contained no butter fat and this statement is corroborated by the manufacturer of the product.

The graph tells its own story regarding the weights of these 7 children more eloquently than words can do. Interpreting this, it seems to indicate that the gain in weight during the last 6 months shown, and during which butter constituted a part of the diet, the children not only experienced a normal gain but also went one better and made up the loss in weight they had suffered during the previous 6 months or the oleomargarine period. In





other words, if we chart a curve along the tops of the columns for the 4 butter periods, we have a progressive increase in weight during the $2\frac{1}{2}$ years, on which the influence of the oleomargarine period is insignificant.

AN EXPERIMENTAL AND CLINICAL THERAPEUTIC STUDY OF WHOOPING-COUGH (Bulletin of Johns Hopkins Hospital, July, 1920). David I. Macht made a study of about 115 cases of whooping-cough, the majority being children ranging in ages from a few weeks to fourteen years. All other medication was discontinued and the patients were given a 20 per cent. solution of benzyl-benzoate by mouth. The dosage varied from 5 to 40 drops in water, three or four times a day and oftener, depending upon the age of the patient and the severity of the disease. If the simple alcoholic solution of benzyl-benzoate was found to be too distasteful to the young patients it was flavored with a few drops of benzaldehyde and the medicine was administered in sugar water or milk. About 90 per cent. of all the patients showed more or less beneficial effects; about 50 per cent. exhibited marked improvement in the symptoms. The therapeutic effects of benzyl-benzoate were not of a curative character but were of a distinctly palliative nature. The findings are summarized in the following conclusions: 1. The administration of benzyl-benzoate solution alone, and still better, in combination with small doses of benzaldehyde, exerts a beneficial palliative effect on the violence and number of whooping-cough paroxysms. 2. The mode of action of the drug in such cases has been investigated experimentally (discussed by the writer in the text). 3. In view of the low toxicity of benzyl-benzoate and benzaldehyde, and the considerable number of successful therapeutic results obtained with them, their further trial in the symptomatic treatment of paroxysmal cough and especially of whooping-cough is deemed advisable.—*Medical Record*.

SOCIETY REPORTS

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON PEDIATRICS.

Stated Meeting, Held April 8, 1920.

CHARLES HENDEE SMITH, M.D., *in the Chair.*

DIRECT LARYNGOSCOPY IN CHILDREN.

DR. HENRY LOWNDES LYNNAH read this paper. (To appear in a later number of ARCHIVES.)

NEPHROLITHIASIS IN A GIRL OF THREE YEARS.

DR. MINER C. HILL and DR. A. R. STEVENS reported this case, the report being presented by Dr. Stevens, who stated that the patient was a little girl 3 years of age last November. She had been perfectly well until 2 years of age and had had none of the diseases of childhood. In the fall of 1918 her parents thought she was not quite up to the mark and called in a pediatricist of this city. He found nothing out of the way except pus and bacilli in the urine. He treated the patient with alkalies for a period of time. The result of this treatment they did not know; but the following spring, last June, she came under Dr. Hill's care. He found a very healthy looking child, but discovered a good deal of pus and bacilli in the urine. For about 2 months he treated her with alkalies and then with acid sodium phosphate and urotropin. These remedies seemed to make no impression on the condition. Dr. Hill then called in Dr. Stevens. As the little girl was apparently quite well otherwise, they had deferred investigation until last fall. At that time a radiograph was taken and they were surprised to find numerous calculi in the left kidney. The right kidney at first showed a suspicious shadow, but no stones were found on further examination. Early in January, a double ureteral catheterization was done under gas and oxygen. Both ureters were catheterized with No. 5 catheters, using a cystoscope of French 18 caliber, and specimens were obtained from both kidneys. An intravenous injection of phenol-

phthalein was given to test the relative function of the kidneys. A wax-tipped catheter was passed up to the right kidney and there was no scratch on the catheter. The right kidney, from the tests made, seemed to be normal. From the left kidney pus and gram negative bacilli were obtained. The urea from the right kidney was 1.2 per cent. and from the left 0.4 per cent. There was about three times as much phthalein from the right as from the left kidney. Inasmuch as there was pus in the left kidney and not in the right, it was deemed advisable to do a nephrectomy. There were 6 or 8 stones present, and even if one removed all of these stones and left an infected kidney there would be danger of the opposite healthy kidney becoming infected. Dr. Holt and Dr. Blake, in consultation, agreed that a nephrectomy was indicated.

On January 25, a nephrectomy was done and Dr. Stevens removed a pyonephrotic kidney. The largest stone and one smaller one were left in the specimen. Practically all the calyces were occupied with granular masses composed of one-half phosphates and one-half uric acid. On the fourth day following the operation, the urine was clear and free from pus and bacilli, and has remained so since.

Dr. Stevens said we did not hear much about surgical conditions in the kidneys of children, and both Dr. Blake and Dr. Holt said they had not seen a case just like this one. Of 320 cases of kidney stones in children (one-half of these were autopsies), 140 were found in children under 1 year of age and only 26 in children from 1 to 6 months old. When renal calculi are present in babies, the supposition is that the babies usually died.

They wished particularly to call to mind the fact that surgical conditions occurred in the urinary tract in children oftener than we thought; and to suggest that if, after 2 or 3 months treatment by ordinary methods, pus could not be made to disappear from the urine, it was well to have these cases further investigated to more carefully locate the source of the pus.

THE SUBOXIDATION SYNDROME IN CHILDHOOD.

Dr. CHARES GILMORE KERLEY and Dr. LOUIS BERMAN presented this paper. They stated that the condition which they had designated as the "suboxidation syndrome" was found with few exceptions in the offspring of the well-to-do. The forebears of

children presenting this syndrome were usually those who had lived indoor occupational lives for 2 or more generations—those who had been occupied with intellectual pursuits and not with manual labor. The child with the suboxidation syndrome was one whose physical functions were habitually below normal. There was a lowered capacity for endurance and his emotional control was defective. As a rule the child was precocious and mentally over-active. There was a tendency to erythema, mild eczema, perspiration was scant, low temperatures were keenly felt. A moderate anemia was present in most cases. A frequently encountered feature was a tendency to febrile rhinitis and bronchitis. It was rare to find a patient of this type who had not had tonsils and adenoids removed with little or no benefit. Another feature of this syndrome was a tendency to recurrent vomiting. Not all cases showed the identical train of acute manifestations but in one respect they were very similar; they had a defective metabolism for the hydrocarbons, particularly for cows' milk fat in the amount that they had accustomed themselves during the last few decades to give children.

A series of illustrative cases was cited showing that the noteworthy feature in nearly every case had been the improvement in appetite and the marked gain in weight as soon as the fats and sugars, which had been given above the capacity of the patient, had been removed from the diet. An examination of the urine in a certain percentage of these cases showed a slight but constant acetonuria on an ordinary diet, and those subject to attacks of vomiting showed marked acetonuria during the attack. A study of the blood in these cases had shown a hyperglycemia varying from 130 mg. of glucose per 100 c.c. of blood as the lowest, to 280 mg. per 100 c.c. as the highest, in a series of 67 cases, the average being 163. The blood sugar of 93 children not belonging to this group was examined and found to vary between 80 and 125, averaging 105. The method used to determine blood sugar was an adaptation of Benedict's modified picric acid and picrate method to finger blood along the lines followed by Epstein in applying the original picric acid method.

Discussion.—DR. HERMAN SCHWARZ, referring to the clinical side of this question, said he had seen a great many cases with the syndrome Dr. Kerley described, who had eaten very little sugar. Quite a number of cases coming under his observation had not

responded to reducing the sugar as such. Personally he did not see how it could relieve the condition simply to withhold sugar, if the children were having bread and cereal, though there might be an easier absorbability of sugar. When Epstein brought out the modification of the Benedict method of estimating blood sugar, the speaker made a great many examinations, especially in cases where there seemed to be intolerance to sugar as shown by increased number of movements. Here he found the blood sugar in the early morning before breakfast perfectly normal. In cases of eczema and so-called exudative diathesis, blood sugar was not regularly increased. He had plotted out the blood sugar curves and could not see any difference in the reaction of the blood sugar in these children to those in normal cases.

DR. HENRY DWIGHT CHAPIN said that in the paper by Dr. Meyer and himself, recently published in the *American Journal of Diseases of Children*, it was shown that a number of cases showed hyperglycemia with very little or no glycosuria. In the line which Dr. Kerley had studied much might be learned from examinations of the blood. One point that Dr. Kerley mentioned might be given more emphasis, namely, that many tonsils and adenoids had been removed that need not have been removed on the assumption that the troubles of which the child was complaining were due to that source, when, in fact, they were quite often caused by faults in metabolism or in feeding. He was very glad Dr. Kerley had brought that point out.

DR. BERMAN said that in reference to Dr. Chapin's remarks, they were interested to see the figures of Dr. Chapin and Meyer, published in the *American Journal of Diseases of Children*, showing a hyperglycemia in children suffering from recurrent vomiting. They were published when Dr. Kerley and he had practically completed their studies, and they confirmed and were in accord with their own results. However, they were practically all obtained in institutional children. It should be emphasized that their studies were made in private patients, under the conditions of everyday life. Institutional life meant a definite and abrupt change in the régime of the child which must reflect itself in its metabolism. The 2 sets of results were, therefore, not strictly comparable.

The same comment applied to what Dr. Schwarz had said regarding his work on the blood sugar in cases of sugar intoler-

erance. Besides, sugar intolerance and the suboxidation syndrome were not necessarily synonymous. Then he employed Epstein's method, whereas they had used, on the advice of Dr. Benedict, a finger blood modification of Benedict's revised picric acid and picrate method. The figures they obtained with their controls in 92 cases of the most varied conditions, varying between 80 and 125 mg. per 100 c.c. were absolutely comparable with those obtained when one used larger quantities of blood. The only other criticism possible of their results was their relation to mealtime. These determinations were made in the afternoon, at least 2½ hours, and in most cases 4 or 5 hours after lunch, which, as far as carbohydrate was concerned, was the lightest meal of the day for these children. In view of these facts Dr. Schwarz's results could not be compared with theirs.

A question had been asked about the relation of the caloric values of the children's diets to the suboxidation syndrome. They had not gone into the question of the exact caloric values of the diets, but it was obvious from the dietetic schedules that the children were being calorically overfed on the foods of the highest caloric value—milk, milk fat and cane sugar.

It might be interesting to go into the evidence that justified the use of the term "suboxidation syndrome." The earliest metabolic study of recurrent vomiting, the typical symptoms of the syndrome, was made by Holt sometime in the nineties. He showed that at the height of the attack there was an increase of some 200 to 400 per cent. in the amount of uric acid excreted, corresponding to that found in the crises of gout. Then Rachford of Cincinnati showed a marked increase in the paraxanthin and hekroxanthin bodies of the urine in the attack, and he had put down this as well as the increase in uric acid to a break in the chain of oxidation of the nucleic acid molecule. Then Howland and Richards redirected attention to the importance of the suboxidation of the carbohydrate molecule by their finding of lactic acid in the urine at the height of the attack, later confirmed by Underhill and Steele—lactic acid having been definitely established by Lusk as a product of the break in the chain of oxidation of glucose in the organism. They also showed in experimental animals, poisoned by cyanide and chloroform, which interfered with body oxidation in general, that with general symptoms of intoxication, including vomiting, there occurred in the urine lactic

acid, and an increased neutral sulphur, that was to say oxidized sulphur. Finally, Sedgwick of Minneapolis, and Mellanby of London showed that at the height of the attack an increased creatinuria, creatin and creatinin metabolism did not belong to the realm of certainties, and definitely demonstrated conclusions, but that there was a relation between an increased creatinuria and interference with the course of carbohydrate metabolism many investigators agreed. All the evidence pointed to a sub-oxidation occurring at least paroxysmally in these children. Their work showing the existence in them of a hyperglycemia, when apparently well, proved that there was in them a continuous disturbance of metabolism, which went on to crisis. The fact that in between attacks there was a hyperglycemia, was interesting as pointing possibly to the biological value of the attack as an attempt to get rid of suboxidation products. A synthesis of all these findings had been attempted in the term "suboxidation syndrome."

FROZEN MILK.

DR. HAROLD RUCKMAN MIXSELL presented this paper. (See ARCHIVES OF PEDIATRICS, May, 1920, p. 270.)

Discussion.—DR. HERBERT B. WILCOX said that some years ago he became interested in a report by Dr. Talbot of Boston on the apparent effect of frozen milk and very shortly afterward another report came from Burlington, Vt., on the same subject. Dr. Talbot's report was on 20 or 30 cases and the other writer reported 11 cases. They spoke of the effect of frozen milk as being constitutionally depressing rather than as producing a definite type of intestinal lesion.

At Bellevue they had a number of cases of gastrointestinal disturbance and in investigating the cause found that the milk they had been getting had been frozen in the cans. There were 46 children affected, varying in age from a few weeks to several months. All but 7 were, before taking this frozen milk, non-complicated feeding cases. The majority of these children were getting raw milk mixtures, some were getting raw skimmed milk, a few were on boiled milk, and a few on eiweiss milk. Some were taking milk with a high fat content and some were taking fat-free milk. In this series of cases, 2 things stood out most promi-

nently. One was that in 36 children those who were worst were the ones taking whole milk, unboiled. Those who were least affected were the ones taking boiled skimmed milk. The most striking symptom of these cases was the appearance of the stools. After the first 24 hours, they began to have diarrhea, which varied in intensity from 2 or 3 to 8 or 9 movements a day, which were light green, non-homogeneous and covered with a thick layer of mucus. They were all alkaline. Over one-half of the children vomited their food and afterward continued to try to vomit until the next meal. The loss of weight was striking. The ward before this had been showing a moderate but continuous gain in weight, but after the first day, when they used frozen milk, that was from the 21st to the 23rd or 24th of February, the weight curve dropped. Three of the children were severely depressed and 1 died. They were not sick from any discernible cause except something that upset their digestion. No study of the milk was made except to find the bacteriological count, and that did not vary much from the ordinary count.

When milk was frozen it was a question what element was affected, but he believed that freezing produced a definite effect upon the milk and that it caused vomiting and a peculiar intestinal toxemia. From their observations it seemed possibly that there was some change in the fats, and also in the casein.

DR. CHARLES GILMORE KERLEY said he thought they were all very much indebted to Dr. Mixsell for making a study of this subject. He would be very glad to use this work as a means of reference. He thought there was no doubt whatever that a substance as delicate as milk must be influenced by freezing.

Dr. Wilcox's observations were very interesting, but the condition of that milk before freezing occurred was not known. It was possible that some other element beside simply the freezing was involved. The fact was that very little milk reached the city from January 1 to March 1 that had not been frozen before reaching the consumer. It seemed that if frozen milk was much of a factor in producing intestinal disturbances in children, we would see many more cases that could be traced to this source than we did. Dr. Kerley said he could still stand by the statement which Dr. Mixsell had quoted that as a factor in the usefulness of milk freezing cut very little if any figure.

DR. CHARLES HENDEE SMITH said it seemed that there were 2 things pretty definite about frozen milk: first, that some frozen milk certainly poisoned some children and, second, many children took it without any apparent ill effects. It had been his experience that after a cold snap he always received a good many telephone calls from mothers who reported a gastrointestinal disturbance after using frozen milk. If the children were put on barley water, the condition cleared up in 24 hours. It is well to bear in mind that a great many things might happen to milk as the result of freezing, and to have milk boiled after it had been frozen and where there had been undue delay in delivering it. It was not uncommon during a cold snap to see bottles of milk bearing a 3 day old label, and that might be one factor in producing results that had been attributed to freezing. There had been some study of what happened to milk that was frozen and thawed, but not of what changes took place when it was frozen and thawed and again frozen and thawed out. Was it not possible that freezing changed the inhibiting qualities to bacterial growth and that milk that had been frozen became toxic more quickly after being thawed than milk that had never been frozen and thawed. It seemed that boiling the milk after it had been frozen did detoxicate it. At the time they had that epidemic at Bellevue they were using Grade B milk in cans and that might not have been as good milk to withstand the effects of freezing as some other milk.

DR. ELIAS H. BARTLEY asked about cream kept 3 or 4 months in cold storage, whether that was known to poison anybody. In April and May, when milk was abundant, the cream was separated and placed in cold storage. It was not frozen but was kept very close to the freezing point. It was true that such milk and cream did sour very rapidly after being taken out of cold storage. Dr. Bartley said it had once been his duty to investigate a case in which ice cream had caused wholesale poisoning. He found one particular can from one particular farm which had been kept back over 2 weeks. This was kept in spring water and evidently in this case the long keeping had produced a change in the cream. When kept in cold storage, cream did not become poisonous and he judged from what the reader of the paper said, that a proteolysis took place, altering the protein constituents. If at the end of 2 weeks there was a development of amino-acids,

sufficient to be detected by chemical tests, at the end of 3 months there must be quite a considerable change of that kind in the casein, yet if this was so it was rather surprising that we did not see more cases of gastrointestinal disturbance due to the consumption of such cream.

DR. J. FINLEY BELL said it was not so much a question of chemistry as of bacteriology. The lactic acid producing bacteria were destroyed and spore bearing organisms left unharmed.

DR. MIXSELL, in closing, said he had nothing to add; he had simply endeavored to review the literature. His experience on the clinical side of the question was limited. He believed it better, however, to play safe and to give some other form of milk rather than that which had been frozen. The age of the milk and the duration of the freezing were factors to be considered. The consensus of opinion was that milk should be used within 48 hours, because up to that time there was no marked bacteriological change, but after that time there was an increase in the bacteria and putrefying bacteria increased very rapidly. Putrefactive bacteria were a great factor in the decomposition of milk that had been frozen.

THE NEW YORK ACADEMY OF MEDICINE—
SECTION ON PEDIATRICS

Stated Meeting, Held May 13, 1920

DR. CHARLES HENDEE SMITH, *in the Chair*

A STUDY OF THE SOCIALLY MALADJUSTED

DR. L. PIERCE CLARK stated that any classification of the socially maladapted, with or without intellectual defect or with reactions similar to the precox, failed of large utility in any practical issue. With a great show of reasonableness some had argued that these pathologic personalities varied insensibly from the normal individual with slight, benign defects of social adaptation during adolescence to those with the most malignant, enduring intellectual and emotional instability, and that no classification for the group was possible or even desirable—they seemed satisfied simply to call such morbid personalities the *socially un-*

stable. The time was not yet ripe for the use of any sharp distinctive term for the various phases of social maladaptations.

In considering the constitutional psychopathic inferiors, Dr. Clark said that if a psychologist had first been consulted he had frequently classed the subject as a normal, dull person, possibly 2 or 3 years retarded in one or more mental tests but not in all. The psychologic test of the practical judgment in this class of persons usually presented marked defects, often grading only as high as the 12th or 14th year. They also showed defective manipulation and generalization of specific tests and subjects. There was a lack of self confidence and a half-hearted attempt to correct the simple faults. The tested subject lacked grit to stick to the individual problem and often graded much lower owing to inefficient arousing of determination and will to accomplish the required test. The mental development was almost always more asymmetrical than the average person's of the same age and opportunities. In the opinion of the more formal psychiatrists this type of person was often thought to be a potential precox or a moral imbecile owing to his instability of emotional control. These unstable persons formed a large class of all sorts of social and business misfits. The main practical defect was evidenced in a weakness of will in all the human activities. Though the intellectual endowment might be good in a superficial estimate, it was easily shown in the majority of cases to be mediocre. Often they were keen observers, were vivacious and knew how to use their limited powers to the best advantage. On the other hand, they lacked energy for continuous work, soon grew weary and were unable to complete any course of education, their knowledge being superficial and fragmentary. Higher intellectual development was defective, conception was confused, and judgment was immature and one-sided, while their interests centered around frivolous pleasures and they did not respond to the more serious side of life. There was often a tendency to build air-castles and to day dream. Emotionally they showed abrupt changes; at times elated and confident, and at others spiritless, sensitive, and pessimistic. There was usually an increased irritability, sensitiveness, and peevishness, though they were as a rule harmless and good natured. They were not inclined to submit to privation but demanded comfort and luxuries, regarding restrictions as a personal insult. As soon as they had to stand

on their own feet they were helpless. Since work was not agreeable, they often changed, hoping to find a more congenial occupation. They excused their unproductiveness in various ways, never attributing it to faults of their own. They were usually unashamed of being dependent upon others for support, and believed circumstances justified their conduct. Many of these unstabiles were gradually forced into lives of vagabondage by their congenital instability and not by unusual circumstances. The same condition was shown to exist in the offspring of well-to-do parents, who, notwithstanding an apparently good endowment and good education continued to be wholly unstable. One rarely failed to find in the family stock traces of degeneracy. From this description, the essayist said it was evident that we were not dealing with a special type of moron nor was the condition very closely allied to dementia precox. The main concern in dealing with these people was to acquire a more intimate knowledge of the essential emotional defect and determine, if possible, a less clumsy method of dealing with such people than was generally employed. In everyday life the final termination of the career of these constitutional inferiors was to swell the rank of vagabondage of high and low degree, and the ne'er-do-wells shown in alcoholic and sexual excesses and specific antisocial tendencies to steal, lie, and swindle. The question was, what might be done for these individuals. It was known that if the defects were not great a proper regimen of training might help. In order that one might establish proper pedagogic reconstruction, certain facts must be recognized. Society immediately took an uncharitable and unfriendly attitude towards one stigmatized as a public confessant of wrong-doing. In consequence we did not adopt the frank and open plan of dealing with the situation, which caused these individuals to note the hypocrisy in such an attitude and added fuel to their innate distrust of the general currency of moral honesty. Inasmuch as the parents, and not the socially maladaptive individuals themselves, were seriously concerned by the attitude of society, the latter, hardened by flagrant delinquencies, often "sat tight" and nonchalantly taunted those sincerely interested in their welfare with the query, "What are you going to do about it? This dilemma is not one of my choosing or concern." If such persons could be counted as legally insane, commitment and sanatorium care would then be possible. Social

policing by camouflaged tutors and companions was difficult, and a game in which the trump cards were generally in the inferior's hands. Anything like a fair and open policy with these individuals outside a reform school or occupational sanatorium seemed impossible. The régime, even though it provided proper tutoring and companionship of the trained attendant, if not backed by institutional discipline and mutual coöperative management, was next to never adequate or successful. Absolute candor tempered with kindly but firm sympathy constituted the necessary atmosphere for the care and training of constitutional inferiors. Since everything depended upon the degree of insight the inferior gained into his own faults of character, it became evident that the kind of teaching needed assumed an entirely different aspect from that ordinarily practiced even in the loose association of a boys' outing school, although the latter combined with boy scout training more nearly approximated the method of teaching than any other. Personal talks in which the preaching attitude was eliminated was the better system to follow. The most obvious fault in the majority of inferiors was their unwillingness or inability to subscribe to and to practice the usual social customs of everyday life. Tact, perseverance, and friendliness were the main leads in the process of education. A continual influence which strongly emphasized the mutual coöperation of the group in the same pleasures, instruction, and athletics would aid in getting the best results. The main advantage sought in such a plan was to establish a sort of free social environment in which the inferior mechanism of the individual could adjust and get something out of it.

It was quite obvious that the abnormal trends in development, if not inherited, began to show themselves in the early nursery period of the home training or as soon as the child had passed into the care of the school with its broader associations and discipline. Therefore, training treatment should be instituted at that time. Mental clinics should be established in connection with our public schools where each pupil might be considered as a probationary pupil; where this type of child would be detected and corrective measures applied at the time the mental conflicts were first shown. Dr. Clark suggested, for those incapable of making the normal grade of social adaptation, a series of ethical community groups, something on the plan of the George

Junior Republic, of institutions providing the community environment and ethical training needed for character building, and urged the need of education for the general public as to the nature of these social defects.

Discussion—DR. BERNARD GLUECK said he had misunderstood the real purpose of the evening's discussion. He did not know that Dr. Clark was going to confine himself to the consideration of that fairly well defined class of the constitutionally inferior. He agreed in the main with Dr. Clark as to the care of these patients and thought there was need in the management of some of them for an institution such as Dr. Clark had outlined. He had been utilizing the George Junior Republic for this purpose. However, he had in mind in thinking over the subject none of the clearly defined socially maladjusted but rather those less clearly understood and medically not wholly definable individuals concerning whose management we are not justified to speak with such definiteness. The treatment of these individuals is still in an experimental stage and progress rests in the main upon a better understanding of those environmental factors which contribute so largely to their social maladjustment. A fuller realization of the tremendous rôle, which environmental contacts and influence play in shaping of character and personality and in determining conduct, emphasizes the constant necessity in the management of the socially maladjusted of treating other members of the family besides the individuals directly concerned. Even progressive psychiatry leans altogether too far in the direction of a fixed static concept of the personality, and difficult and hampering traits and characteristics are assumed to be, without much warrant, inborn fixed attributes which predetermine conduct. The case for this assumption is not very strong since we have constant proof of the fluidity and changeability of human characteristics and traits. Social treatment, therefore, embraces as a first step a clearer recognition of the importance of the social setting and the social heritage in shaping character and in conditioning conduct. The socially maladjusted, far from being entirely definable on the basis of innate characteristics alone will continue to constitute the most difficult problem that psychiatry has to deal with until we learn to estimate more accurately social values. Psychiatry in stressing the concept of man as a

biological unit has ignored altogether too freely man as a social being. One of the most commonly met with manifestations in the socially maladjusted is a feeling of inferiority and a sense of having lost the esteem of one's fellow beings which renders adequate social adaptation, if not impossible, certainly very difficult. Now a medical approach in the strict sense of the term can do very little where the individual must be led by means of social measures such as education, appropriate outlets in his work and play life, cultivation of fellowship, etc., to either a rational acceptance of his inferiority, if such actually exists, or to an overcoming of it, if that is possible, through the cultivation of such assets as he does possess and through obtaining a gratifying sense of personal worth. Man in his craving for self-expression and self-realization endeavors to break through "the western front" along some sector and it is the object of social treatment to help him discover the sector appropriate to his needs and capacities and to make victory possible. Many of the socially maladjusted owe their difficulties to a too pronounced discrepancy between personal equipment and aspirations, and while this often constitutes the bridge that makes progress possible it frequently means ruin to the personality if the discrepancy is too wide or the environmental obstacles too serious. It is another important task of social treatment to help man find his proper niche in the scheme of life. A medical approach will continue to be relatively impotent in the management of the problems of social maladjustment until it recognizes fully the value of the social approach both in the diagnosis and treatment of these cases.

SEX CONFLICT IN ADOLESCENTS.

DR. C. O. CHIENEY said that Dr. Clark's discussion demonstrated the value of detailed individual case study of the socially maladjusted, and emphasized the importance of mental conflicts as causes of social difficulty. The individual, who had no conflicts in his inner life, had no conflict with society and went along the even tenor of his way, meeting and reacting to situations in life in ways that were best for himself and others. Poor adjustment to society, as shown in bad behavior or misconduct, was the outward manifestation of internal maladjustment or mental conflict. There were no doubt many causes for mental conflict, but

one of the most frequent and important causes was the difficulty of adjustment in the sex life, and it was these sex conflicts and their manifestations that he wished to touch upon here. There was a universal and strong inner force demanding the satisfaction of the sex instinct, but there was likewise an almost universal and strong repressing force exerted by society against this satisfaction, particularly in children and adolescents. This situation was thus an almost perfect one for the formation of a conflict. The curiosity and desire for knowledge of the child were heightened in the adolescent who began to experience the physiological yearnings and feelings. Some individuals, feeling no restraint by bringing up or environment, proceeded to satisfy their desires freely in a way that was looked at askance by society, but which, however, freed them from any actual inner sexual difficulty. Other adolescents, perhaps under the understanding direction of their elders, receive an outlet for their sexually aroused emotion in healthy social activities, sports, or amusements. Another form of outlet, perhaps less healthy, was exemplified in the "crushes" of girls for each other and the admiration and infatuation for matinee idols. With these young people, as well as with those who gratified themselves sexually in their own persons but have other outlets for their emotions, there might be little or no mental conflict in adjusting their sexual life. That, however, this substitution for sexual activity might assume a pernicious aspect has been admirably shown by Healy in his "Mental Conflicts and Misconduct." In his presentation it was brought out that instances of stealing, truancy, vagrancy, running away from home, mischief making, and cruelty might be the outlets for emotion that had been previously aroused by sexual feelings, or by the acquirement of sexual knowledge. These young people tried to force these feelings and knowledge out of their minds, but as the ideas recur, to the discomfort of the sufferers, there resulted emotional states leading to misconduct; this misconduct might be of an impulsive, uncontrollable nature and not understood by the individuals until analyzed. Finding of the trouble, removing the conflict and aiding in the prevention of its recurrence by change of associates or environment result in cessation of the misconduct if the latter had not become a fixed habit. This study of Healy, which could be only so briefly mentioned here was extremely illuminating as to the bearing of

the sexual conflict upon delinquency, and was strongly stimulating for further studies along the same line.

More familiar to most of us as peculiar manifestations of adolescence were the restlessness, general dissatisfaction with things, irritability, moroseness, shyness, increased religious activity, or interest in socialism, philosophy, or new thought. There was good reason to believe that these were very often merely symptoms of the sex conflict and mental uneasiness, with an attempt at some form of satisfaction and adjustment. We had no means of knowing in how many instances these attempts at adjustment were satisfactory and the individual freed from conflict. As so far as he knew there were no studies made on those who do not come under special care of observation for their difficulties. Those who were continually in contact with maladjusted persons in mental clinics and hospitals did know, however, that there were many adolescents who either had much difficulty in handling their sex conflicts, or who, never making an adjustment, needed care throughout their lives. They were those types who, finding an outlet only in their own bodies, with the presentation of various physical complaints, make up the psychoneurotics or who, living in sexual phantasy, day-dreaming, and unreality, showed the symptoms of what was called dementia precox. "Of what concern was all this to pediatricians?" This could be answered by saying that those in the mental hospitals saw the late or end stages of sexual maladjustment, when the habit from conflict had become fixed; that in these stages they found from trial that often attempts at helping adjustment were fruitless; that the time for help was best afforded in childhood and adolescence, and that, as the physicians of these young people, we might be of immense help to them. The question might be asked: "What was to be done?" To this certain suggestions might be offered based upon their frequent experience with what had *not* been done.

In the first place parents should be disabused of the smug idea that sex was not to be mentioned or thought of until marriage and shown that it was natural for children and boys and girls to have curiosity about their own bodies and how they came to be in the world; that evidence of this curiosity should not be met with the reproof that it was bad or naughty, but should be met in a frank, straightforward way by explanation. If this

practice of honesty was carried out there would, he thought, be less of the antagonism, contempt, or hatred of parents by the grown children when the latter found they hadn't been played fair with.

And when children or adolescent patients were brought to the physician with the report that they were nervous or cranky or disobedient, or were otherwise showing they were not happy in their lives, he believed it would pay to get their confidence, go into their worries and conflicts, advise them and their parents and, if it seemed best, change their environment. The older adolescent persons would benefit by some advice about their sexual physiology and be saved from resorting to quacks who would terrify them with horrible tales of the results of sexual self-satisfaction—the tales that we read about and heard from our patients. Attempts to repress and stop an unhealthy sex habit would result only in more conflict if nothing of healthy activity or interest was given the adolescent. Each case was an individual study and he believed that such study and treatment of conflicts and behavior would not only promote mental health in children coming under their care, but would be a source of satisfaction to the physicians.

THE INFERIORITY COMPLEX IN CHILDHOOD.

MISS EDITH R. SPAULDING said that in the reconstruction which was necessary in the lives of the children with whom she had come in contact, the feeling of inferiority from which they suffered seemed to be one of the most important points of attack. She cited 2 cases which she was seeing at the present time, in which this factor was an exceedingly important one. The first case was that of a boy 7 years of age with a neurotic family history, in which however there was no definite mental disease in spite of a breech birth 34 hours in duration. He appeared healthy and well nourished until 2 years of age, when he had a fall, landing on the top of his head. At the age of 1 year he had pneumonia, at which time he had a convulsion. At the age of 5½ years he had whooping cough and what was apparently a second convulsion; his eyes dilated, he fell and became unconscious. Since that time he had continued to have convulsive attacks in which he threw up his arms, rolled his eyes up, and gasped; sometimes he had fallen. These attacks were some-

times very slight, but were thought to have occurred 30 to 40 times a day. He also had what were termed "silent times" when he said little for 3 or 4 days. The attacks came on when he was disappointed, and it was thought he enjoyed working himself up to the point where he was sure to have an attack. The interesting thing was the way in which the condition the physicians and neurologists who had seen him agreed was minor epilepsy responded to the treatment of his feeling of inferiority. This treatment consisted in finding constructive interests for him, in treating him as a healthy boy rather than as a weakling and expecting from him the behavior of a manly boy rather than that of an infant. The bromide and thyroid treatment that he had been having was temporarily discontinued. From having attacks almost incessantly under the former treatment, he soon began to have only 13 a day, and 2 weeks later only 3 daily. While it was still an effort for him to undertake anything new, because of his great fear of being unable to do it, when it was actually accomplished he positively strutted with pride. There was little danger of his having an attack at such times.

The mental tests of this boy showed his mental age to be but 6 months below his chronological age. His failure to do certain tests appeared to be due to lack of training, since his native ability and learning ability were both good. His comprehension was unusually good, while his difficulty appeared to be in his power of attention, his concentration and his muscular coördination. He had a sister 2 years younger than himself who had a spontaneous personality and was very brilliant and of whom he was jealous. Gradually the attitude of the family had been to treat him as an invalid and as an inferior mentally. The marked change that took place in the personality of this boy in 3 weeks, away from his home environment, where he had an opportunity to develop his individuality, was quite startling.

The second case which the speaker described was that of a boy 10 years of age, who disliked to play with other boys because he realized that he was unable to do well in sports and come up to the mark in physical activities. It was this fundamental feeling of inferiority, based perhaps on a slight cardiac condition, together with an over-solicitous mother, that was the basis of his maladjustment. In trying to compensate for his lack of popularity among the boys, he had played very much by himself, or

with a single friend. If encouraged to play with other boys in a group he said he disliked to do so, because he had to follow out their plans, as they were not always willing to follow his. But if he played with only one he at least stood a good chance of his plans being carried out half the time, and probably more than that. Furthermore, if he was forced to play with a group of boys part of the time he wanted at least 2 hours a day in which he could play by himself. He said "I like to talk things over with myself and I always feel happy in my own company." This boy was at the present time trying to compensate for his failure to make good in the school world by retiring into a world of his own phantasy. He had a sex habit which he commenced at the age of 2 and stopped at the age of 6 years. He said that after he went to bed at night he enjoyed thinking of a very beautiful woman whose face was always a blank, but whose form seemed the composite picture of the beautiful women he had known. Sometimes he was kneeling at her feet; sometimes she took him into her mouth, ate him up, and he was surprised to find himself, after the process, alive and whole again. From other conversation with him it seemed likely that this represented an association with the question of pregnancy, which was apparently actively present in his mind at the time, and more specifically the facts of his own origin, and perhaps his interest in the period in which he was a part of his mother. He said that in some ways he did not wish to grow to be a man, he preferred to remain a baby. Asked why, he responded that if he remained a baby he was much more sure of being loved than if he grew up. And when asked by whom he wished to be loved, he stated frankly, "My mother. I love to have her come to my room at night and caress me." Incidentally, he felt that when he grew up the accomplishments, which at his present age appeared quite remarkable, would then be taken as a matter of course. This, again, was too much for his egotism to face. In addition, this boy had a fear of mirrors, which, when followed up, appeared to result from a fear of thieves. This was not because he feared they would rob him, though he was mercenary in the extreme, but because he feared they might kill him. This brought him to a discussion of death and immortality and he freely stated that at the present time he believed there was a God, but he was not wholly sure that he could accept a belief in

immortality. There was, moreover, an interesting connecting link between the suppression of his sex habit and his fear of death, because of several things he had been told at the time it stopped.

In both of these cases there were many elements and possible points of attack for the process of re-education. The element to be emphasized, however, was the feeling of inferiority, which in both cases, in accordance with Adler's theories, appeared to be based on an actual physical or nervous inferiority. It is this weakest point that must be discovered and constructively built up if the child's energy is to be turned into constructive and socialized channels.

THE INSTITUTIONAL TREATMENT OF PSYCHOPATHIC INDIVIDUALS.

DR. M. A. HARRINGTON said that Dr. Clark had described the kind of institution that was needed to care for this type of patients and he would merely cite a few cases which would show the necessity of institutional care in the treatment of these individuals. The first case described was that of a boy who was incapable of distinguishing between what was his and what belonged to another person. He committed many thefts and was finally taken to the police station and while there *stole the captain's gun*. He was sent to the Children's Court and then to Ward's Island, where he came under the speaker's care. He seemed to be a model boy in other respects but could not keep his fingers off of what did not belong to him. After a time the people at the office said they would like to have the boy for a page. They were told of his defect but said they would try him. He was there but a short time when they asked that he be taken away as he had acquired too many things that did not belong to him. Among other things it was found that he had three or four watches. Finally the boy was put in a shoe shop where there was little or nothing to take and he got along beautifully and worked well. If he had been left outside in the community he would have become a burden to himself and to society, for he was the kind of individual who made the criminal, but under supervision he would get along all right.

The second case was quite different. This boy's trouble was not misdirected energy but a lack of energy. He got along pretty well in school, but when he went to work soon grew tired

of it and gave it up. He held several positions with intervals of idleness and finally gave up work altogether, became depressed and was finally brought to the hospital. There the energy was provided for him and he was set to work under steady pressure and got along well. After a time his family thought he would get along outside and he went out, but soon fell back into his old habit of idleness. He was followed up and put into the Y. M. C. A., but was not able to get on outside of the institution.

The third case was one illustrating, not misdirected energy, or lack of energy, but poor control. When he started in he worked hard all day, took work home and worked at night, working 18 hours a day. He kept it up about 3 months, then became fatigued, lost heart, and gave up the position, and sat about, indifferent to everything. He was taken to an institution and put in shape and when he got out he did the same thing over again. At the hospital he was given work with regular hours and his time regulated and he got along beautifully, but as soon as he went out there would be trouble again. These were 3 types of individual who needed institutional supervision.

SCHOOL CHILDREN WHO, THROUGH LACK OF EMOTIONAL
CONTROL, DEVELOP HABITS OF TRUANCY.

MISS ELIZABETH E. FARRELL disagreed with the proposition that the maladjusted needed institutional care. She recalled that it was not so very many years ago that she spoke of the mentally defective and feeble-minded groups and she had stated that as there was no one particular adjustment for the normal individual so there could be no one particular adjustment for the feeble-minded individual and this same statement held true of the maladjusted. There could be no blanket system for the management of the maladjusted or constitutionally inferior. As there were personal idiosyncrasies, so education must be personal and individual. This was the principle applied in the treatment of physical ills and it was equally applicable in dealing with mental conditions. The general idea was that this individual prescribing might be done in private schools, but it could not be done in public schools. The private schools did not do any better in individual training than the public schools. The point was that education must be individual, that courses of study must not be

iron-clad; they must be flexible. Provision should be made to adapt the environment to the individual as well as to adjust the individual to the environment. Miss Farrell cited 2 instances of social maladjustment, the first of which was a boy who did well in grammar school but became a confirmed truant when he got into high school. The cause for this apparently complete change of personality was studied and it was found that he did not grasp ideas and abstractions; he liked the practical and concrete. He entered a trade school which offered the environment to which he could adjust, and got along well. The second case was that of a boy going through the elementary school who had ability that he did not realize. He liked to draw but did not get on well in the grades, and played truant. The question came up whether he should be sent to the truancy school. Finally it was decided to attempt to use his love for drawing as a lever which offered a chance for making an adjustment. The boy went to public school on the morning and to the school of design in the afternoon. His ability was such that it seemed he should have this opportunity. There were many cases of that kind where the adjustment could be made in the school, by a change from public to private school or from private to public school, etc. Frequently it was the environment that impinged on the personality and it was our business to modify the environment. There were many ways of caring for the socially maladjusted, but it could not be done by any cure-all, be it institutional or extra-institutional. One way was by breaking down inflexible barriers and by doing personal and individual teaching.

SOME MEDICAL ASPECTS OF CHILDHOOD DELINQUENCY.

DR. SANGER BROWN, II, said one thing that must have occurred to all while the speakers were discussing adult and child delinquency was whether after all there was not something inherent in the personality, either hereditary or constitutionally inherent, which made for just these things. He had spent several years with adult personalities such as were described and had thought that in children he would find the same traits and qualities, but he must say that he had been unable to find the same traits in children as in adults. In speaking of static personality there was much to be said of the development of the personality in the first 10 or 15 years of life. It developed from the situations

in which the child found himself and from the maladjustments and mismanagements to which the child was subjected. All these things went to form character and to make the personality. Those things which were minor at first and perhaps open to correction for the first few months, after they had continued for years became traits of character and the emotional reactions became established and formed the adult personality. This pointed the definite indication for treating and modifying such traits in childhood so that many could be saved from adult delinquency. In reviewing the causes of these maladjustments, perhaps one-third were cases of minor neuroses and got into conflict with teachers who did not understand what the trouble was and disciplined the child. The nervous child could not stand discipline and became a truant, got into bad company and started in the wrong way. If such a child had a special aptitude it should be found and the child given the opportunity to develop it, as this might be the means of making a social adjustment.

Dr. Glueck said he would like more study of the physiological side of these cases. It might be of interest to those present to know that at the Neurological Institute a plan was being outlined for a Diagnostic Clinic for Adolescents, where cases showing various maladjustments to life would receive thorough investigation from every possible point of view—physiological, psychological, mental and physical.

SOCIAL MALADJUSTMENT AS SEEN IN THE CHILDREN'S CLINIC IN
THE DEPARTMENT OF PSYCHOPATHOLOGY AT
CORNELL UNIVERSITY.

DR. L. BLUMGART said that the Children's Clinic at Cornell was started in 1917 in response to the need for such a clinic, so that the State Charities Aid Association of New York and the public schools would have a place to bring children for psychiatric advice. The clinic was held one morning a week for just as many hours as the psychiatrist and social worker could spare. The new cases were limited to 2 a morning and the old patients, for whom appointments were made. Children were seen from 3 or 4 years of age up to and through adolescence and in the course of their experience children were met who had committed every anti-social act possible except murder; theft, arson, forgery, bad sex

habits, etc., were not infrequent. As the work of this clinic became known, other institutions sent children for advice. An important aspect of the work was carried on by having a social worker, and this side of the work should be emphasized. They had a Smith graduate. One could not carry on this kind of work without a social worker any more than he could practice medicine without a stethoscope and a thermometer. The problems of maladjustment were handled from both angles—the environment or social background and the child itself. The child did not come to the clinic until a complete history was obtained. The history was taken by following an outline taken from Dr. Healy's "The Individual Delinquent," slightly modified to meet the needs of the clinic. In making the mental tests they followed the Terman modification of the Binet-Simon Tests and such other tests as Dr. Healy had suggested. These were used to bring out certain qualities or show their absence. The child received a physical and psychiatric examination and such other examinations as were indicated. The advice of the internist or specialist was available, if needed. The child was then interviewed, likewise the parents. The case was then gone over in consultation with the social worker. In this clinic a large variety of conditions were met with. They saw about 100 patients a year.

Dr. Blumgart related somewhat in detail the case of a high school girl of 17 years of age, who was maladjusted both at home and at school. She was finally advised to leave school, but before leaving forged names in a Liberty Bond drive. An x-ray examination showed a very small sella turcica. The social worker had an interview with the mother and asked that she be given medical treatment for a few weeks, as it was possible the girl's behavior was not entirely due to moral obliquity. After the girl had taken pituitrin for 2 weeks she decided to go to business school, and she took up her music again. Her home relations were readjusted satisfactorily. She completed a 9 months business course in 4 months, obtained a position and taught beginners in music in the evenings. At one time the pituitrin was discontinued and she began to relapse; it was given again and she recovered the lost ground. In another case cited, separation from the family and supervision had served to adjust the girl.

The problem of the psychoneurotic child was far beyond any

conception most people had of it. One thing needed was investigation to determine the exact number of maladjusted children. Such an investigation would, he believed, confirm the findings shown by intelligence tests in the army, that there were a very much larger number of such individuals than we suspected. He hoped it would be done soon. The environmental side must be taken into account as much as the individual side.

Discussion—DR. FOSTER KENNEDY took issue with Dr. Pierce Clark in regard to the statement that the greatest need of the time was an institution for the care of the constitutionally inferior and the socially maladjusted. Miss Farrell had taken Dr. Clark to task for the statement and he wished to abet her effort. It was not so much an institution that was needed as some kind of education of the public which would prevent the production of these people. It would seem that we doctors were usually asked in consultation to assume a rôle identical with that which ought to have been assumed by the parent, and often we were appealed to on the ground that, because of their relationship to the patient, their authority was handicapped from the beginning. He believed that, for the most part, we accepted the paradox of such situations without comment and worse still without thought. Of course, when the anti-social trends have developed, we were compelled to comply with these demands and occasionally with success. He could not help feeling, however, that as a profession we were not fully cognizant of the root causes of the growing number of the socially maladapted. As civilizations advance there had been constantly felt a growing interference with the family instinct by increasing rationalization and growing individualism on the part of the child. This weakening of parental authority occurred through a loosening of the bonds of religion—the social machinery for the transmission of traditional thought—and, of course, among foreign-speaking people in a new land, the parental authority was reduced to a minimum. We didn't read enough history and if we did we were so busy with our individual patients that we had not time to look thoughtfully at our world and do our share in its education. The immense stability of China and its latent power lay in its ancestor worship and the Greek and Roman world both dilapidated when the *potestas patris* lost the authority of religion and of public

opinion. The tremendous strength of the Hebrew race through 2,000 years of savage repression has lain mainly in their instinctive patriarchy and reverence for tradition. The loss of these fundamental instincts makes for ill-discipline in the family and society and has not a little to do with sapping national strength and with the production of these problems.

DR. JOHN T. MACCURDY said that as medicine was developing along the lines of prevention and as all who had spoken had acknowledged that prevention was the most important factor in dealing with the socially maladjusted, he wished to emphasize the fact that the pediatricist met these cases first and had a great opportunity to advise and direct the parents so that defects in adjustment could be corrected early in life. It was a joy to know that a liaison was being established between the pediatrician and the psychiatrist. The pediatrician saw not only the glaring cases of maladjustment, but he saw many of those who were mildly maladjusted, and if he would call upon the psychiatrist, who, though he could not boast great knowledge, still had a limited experience, to examine these cases the course of their psychological development might be modified.

DR. CLARK, in closing the discussion, agreed with Miss Farrell that there were certain types of mild maladjustment which could be corrected in the ways she had suggested, and said it was the more marked types that he had considered in his paper, those in which more profound methods of approach were needed.

PURULENT PLEURISY IN YOUNG CHILDREN (*Archives de Médecine des Enfants*, Paris, March, 1919). Bézy and F. Escande explain the blunder in diagnosis in the 2 cases described as due to the remarkable tolerance of the pleura and lung for several months to the presence of and the pressure from the pus. The negative results of puncture must have been due to the thick consistency of the pus or to obstruction of the needle. The misleading resonance in the space of Traube was explained by radioscopy showing an unusually large air bubble in the stomach. Deviation of the heart and mediastinum is the most instructive finding. The boy of 3 was given operative treatment for a supposed osteitic process in the ribs. Radiography may be the only means to detect these latent pleurisy.—*Journal A. M. A.*

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS

A METHOD OF DETERMINING THE APPROPRIATE DOSE OF TUBERCULIN FOR THE INDIVIDUAL TUBERCULOUS CHILD*

By MYER SOLIS-COHEN, M.D.,

Philadelphia.

The therapeutic administration of tuberculin, which not so long ago was lauded in medical journals and at scientific meetings, has of late become unpopular. It has been abandoned by many leading phthisiotherapists who once were wont to enthuse over it and to testify as to its brilliant results. This change in attitude is doubtless due to the fact that even in the most expert hands tuberculin often has been productive of distinct harm, and still more frequently has failed to be of any benefit. The fault

*Read before the Philadelphia Pediatric Society, March 9, 1920.

in both instances may be attributable, it seems to me, not so much to the tuberculin itself as to the common method of employing it.

The Cause of the Harmful Effects of Tuberculin.—The harm comes from the production of what I have termed an unfavorable reaction,¹ which is produced by administering a dose too large for the individual patient. On the other hand, failure to cause improvement is due, I believe, to the giving of a dose too small for the individual patient.

In the course of some studies I made on hypersensitiveness to tuberculin² I found that patients with apparently the same type and degree of tuberculosis differ greatly in their hypersensitiveness to tuberculin, one reacting to one hundred-millionth of the amount necessary to produce a reaction in another.

The usual method of administering tuberculin is to give to each patient the same initial dose, which in the days of its popularity was as a rule one ten-thousandth of a milligram. This dose would naturally produce an unfavorable reaction in a patient hypersensitive to smaller doses. Such a danger can be avoided, as I have previously pointed out³, by beginning with a very minute initial dose, such as one-millionth of a milligram, and increasing the dose gradually⁴ until it produces what I have termed a favorable reaction¹; and holding this dose until it loses its beneficial effect, whereupon it may again be similarly gradually increased. Upon the appearance, however, of any symptom of an unfavorable reaction, the dose must be reduced.

Possible Cause of Failure of Tuberculin to Benefit.—A possible cause of failure to improve under tuberculin treatment was suggested by some observations I made in studying the relationship between tuberculin hypersensitiveness, as determined by intracutaneous tests, and tuberculin tolerance, as estimated clinically in the same patients². In patients who were improving under tuberculin treatment, and especially those that were reacting favorably to the dose given, the amount of tuberculin necessary to produce a reaction when injected intracutaneously usually corresponded fairly closely with the amount the patient was taking therapeutically, whether by mouth or subcutaneously. The converse naturally seemed reasonable, namely, that the appropriate therapeutic dose of tuberculin is probably the dose that produces the minimal reaction when injected intracutaneously.

Further studies and experiments have tended to bear out this view and at the present time I do not hesitate to give as an initial therapeutic dose, orally or hypodermically, the exact amount of tuberculin required to produce a minimal reaction when administered intracutaneously, whether this amount be one-millionth or one-hundredth of a milligram. A circumstance lending support to this view is the fact that in my hands a dose thus administered has never produced an unfavorable reaction. Yet in my former method of administering tuberculin I have seen hemoptysis follow each oral administration of one-millionth of a milligram over a considerable period of time and have observed unfavorable reactions from even smaller doses⁵. If therefore tuberculin hypersensitiveness corresponds with tuberculin tolerance, as my studies would seem to indicate, the latter will vary as much as the former. Consequently in the usual method of giving tuberculin, and especially in my former method of administering a very minute initial dose, the dose given is frequently too small for the patient receiving it. In such instances it should not be surprising if tuberculin treatment proves a failure.

Success in tuberculin treatment in my opinion can be expected only when the individual patient is given his appropriate dose, whether by chance, accident, in the course of systematic gradual increases, or by first determining this dose by intracutaneous tests. Unless there is some reliable method of determining the appropriate dose for the individual patient, tuberculin therapy cannot be regarded as being on a rational basis, or even as being safe.

Such a method has been attempted by White, Graham and von Norman, ⁶, ⁷, ⁸ who make a cutaneous or von Pirquet test with one-tenth of a milligram of old tuberculin (O. T.) (never with T. R.) and reduce or increase this amount until they produce a minimal cutaneous reaction, namely one that gives redness and swelling measuring 4 to 6 millimeters in diameter within 72 hours. They then inject intracutaneously the exact amount that produced the minimal reaction every 2 weeks for a period of 3 months; after which they make another test. The average dose they gave was one-tenth of a milligram. Most of their work was confined to afebrile patients.

While these writers seem to obtain good results with this

method, few have been able to confirm them. Their method presents a number of difficulties and sources of error. The cutaneous or von Pirquet test is not generally regarded as reliable for quantitative work. Not only does the amount of tuberculin that is absorbed from a drop placed upon a scarified surface naturally vary; but it is almost impossible to always obtain the same depth in the scarification. I cannot feel that the cutaneous test is a fair measure of the patient's hypersensitiveness to tuberculin, inasmuch as in their cutaneous tests the amount producing a minimal reaction varied so little (at the most an hundred times) and remained uniform over long periods of time (as a rule 9 months) during treatment; while in my investigation the recognizedly reliable intracutaneous tests showed such wide variations and hypersensitiveness diminished so uniformly during the treatment. White and von Norman admit that their test is not a correct index for determining a subcutaneous or intramuscular dose and they have never used it for determining the dose by mouth. A fact that makes me question whether tuberculin hypersensitiveness or tolerance can be correctly measured by skin tests is that no harm seems to be produced by the one milligram generally employed for the diagnostic von Pirquet test, while in my hands one ten-thousandth of that amount has caused a violent reaction when injected intracutaneously². By testing for hypersensitiveness at intervals over long periods of time, I have apparently been able to demonstrate that tuberculin hypersensitiveness and tuberculin tolerance both diminish as a patient improves, and especially as he improves under tuberculin treatment with doses determined as appropriate for the individual patient². Consequently I am not impressed with a method that gives the same dose over a period of 3 months, especially as in the cases just mentioned I have obtained best results by increasing the dose corresponding to the decrease in hypersensitiveness, sometimes very rapidly.

Author's Method of Determining the Appropriate Dose.—In order to determine the appropriate dose of tuberculin for the individual patient, I first make the following test for tuberculin hypersensitiveness: Intracutaneously in a patient's forearm at the same time one ten-millionth of a milligram is injected distally, one millionth of a milligram medially, and one hundred-thousandth of a milligram proximally, the injections being made in a

diagonal line. By this technique the same lymph channels are avoided and there is less chance of having the lymphatics carry tuberculin from the larger injections to the smaller. Twenty-four and forty-eight hours after the injections are made, their sites are examined for the presence of a papule or of induration, either of which is regarded as evidence of a reaction. If no reaction occurs, one ten-thousandth, one thousandth, and one hundredth of a milligram are later injected similarly in the other arm, the smallest dose being distal and the largest dose proximal. If still no reaction occurs, one tenth of a milligram and one milligram are then injected and, if necessary, at a still later time 10 milligrams.

The smallest dose that produces a distinct reaction I administer therapeutically either by mouth or subcutaneously. The initial dose so determined has never in my hands produced an unfavorable reaction, although in some cases it has been as large as one hundredth of a milligram. If this dose produces a favorable reaction, such as increase of appetite, reduction of temperature, a general feeling of improvement, etc., it is repeated every 3 or 5 days until it loses its effect, whereupon it is gradually increased until it again produces a favorable reaction. If it seems to produce no effect at all, I still repeat it for several weeks and then increase it. Should any dose produce an unfavorable reaction, such as rise of temperature, anorexia, malaise, etc., it is reduced. At intervals, tests for hypersensitiveness are again made by injecting intracutaneously in the forearm the dose the patient is taking and doses one-tenth of and 10 times this amount. If no reaction occurs from any of these, I inject intracutaneously one hundred times, one thousand times, and ten thousand times the amount the patient is taking. If the amount producing the intracutaneous reaction is greater than the amount being given therapeutically, the latter is increased rapidly until it corresponds with the former. I have increased from one-thousandth to one-tenth of a milligram in 4 doses and from one hundred-thousandth to one thousandth of a milligram in the course of a few days without producing any unfavorable reaction.

My usual rate of general increase is about 50 per cent. according to the following scheme: 1, 1, 5, 2, 3, 5, 7, 10, 15, 20, 30, etc. Sometimes I double the dose and occasionally, when it has been

found to be much below the dose producing a minimal reaction when injected intracutaneously, I increase it ten-fold.

This method of administering tuberculin I have employed mostly in children. The form of tuberculin given was tuberculin Rückstand (T.R.), because in an experience with various forms of tuberculins, sera and vaccines⁹ extending over a number of years, I have obtained best results with this form. I have not found that it makes much difference whether the tuberculin is administered by mouth or subcutaneously. Both favorable and unfavorable reactions have followed the former and I have frequently substituted hypodermic administration for oral and vice versa during a course of treatment without ever producing any change in effect or reaction.

I seldom or never give tuberculin to patients who are doing well without it. In the first place, it seems unwise to interfere in such cases, especially as the indications are that the patient is manufacturing the proper amount of anti-bodies and there is a possibility that an additional stimulus may disturb the balance. In the second place, I do not feel competent to judge the effect or the value of tuberculin in a patient who is already improving without it.

REPORT OF CASES.—The method of studying the value of tuberculin by comparing a group of patients taking it with another similar group not taking it, I regard as faulty. The group taking it as a rule undoubtedly includes some who are taking too much or too little; while the fact that some of the other group improve does not signify that they might not have improved still more with their appropriate dose of tuberculin. A much better method in my opinion is the intensive study of individual patients under tuberculin treatment, comparing their condition before and after the administration of tuberculin. The grouping of a number of patients so studied and their analysis to my mind gives more valuable information than does the more common method.

In this paper I desire to report 19 cases in which tuberculin was administered to children in doses determined by intracutaneous tests—a small number, it is true, but one possibly sufficient to illustrate some of the points referred to.

There were 8 boys and 11 girls, all patients at the Eagleville Sanatorium, at Eagleville, Pa. One was 6 years of age, 3 were

7 years old, six, 8 years, three, 9 years, two, 10 years, two, 11 years, one, 12 years, and one, 14 years old. Seventeen were in the first stage of the disease according to the classification of the National Association for the Study and Prevention of Tuberculosis, and 2, in the second stage. Seventeen were in Turban's first class and 2 were in his second class.

The initial dose varied from one hundred-millionth to one hundredth of a milligram, being one hundred-millionth of a milligram by mouth in 1 case, one millionth of a milligram by mouth in 1 case, one hundred-thousandth of a milligram in 12 cases—6 by mouth and 6 hypodermically, one ten-thousandth of a milligram by mouth in 3 cases, and one hundredth of a milligram by mouth in 2 cases.

In 8 patients the initial dose was the exact dose that produced the minimal intracutaneous reaction—one hundred-thousandth of a milligram in 5 and one ten-thousandth of a milligram in 3. In 9 cases I gave an initial dose smaller than that producing the minimal intracutaneous reaction. Before experience gave me confidence, I at first feared to give so large a dose, especially as in some, during a previous course of tuberculin not guided by the intracutaneous test, the dose had been a great deal smaller. To 4 patients I gave as an initial dose one-tenth of the amount producing the minimal reaction—one hundred-thousandth of a milligram to 2, and one hundredth of a milligram to 2. In 3 instances I began with one hundredth of the dose producing the minimal reaction—one hundred-thousandth of a milligram. That same initial dose I gave to another, although it was one thousandth of the amount that produced the minimal reaction. One patient commenced with one ten-thousandth of the minimal test dose—one hundred-millionth of a milligram. On the other hand, in 2 cases I risked beginning with 10 times the amount that produced the minimal intracutaneous reaction—one hundred-thousandth of a milligram in one and one millionth in the other.

The dose was increased in all but 2. Three patients, in whom the dose by mouth had been increased until it was quite large, were then given a smaller dose hypodermically, which was rapidly increased. The dose was increased in one case 120,000 times in 7½ months (from one hundred-thousandth of a milligram to one and one-fifth milligrams by mouth); in one case 100,000 times in 6 months (from one hundred-thousandth of a milligram to one

milligram by mouth); in one case 70,000 times in 11 months (from one hundred-thousandth of a milligram by mouth to seven tenths of a milligram hypodermically); in 3 cases 50,000 times in 6 to 7 months (from one hundred-thousandth to six tenths of a milligram by mouth); in one case 10,000 times in $7\frac{1}{2}$ months (from one hundred-thousandth to one tenth of a milligram by mouth); in one 5,000 times in 2 months (from one hundred-thousandth to one twentieth of a milligram by mouth); in one 2,500 times in $6\frac{1}{2}$ months (from one hundred-thousandth to one fortieth of a milligram by mouth); in one 1,000 times in $2\frac{1}{2}$ months (from one hundred-thousandth of a milligram hypodermically to one hundredth of a milligram by mouth); in 2 cases 500 times in $1\frac{3}{4}$ and 4 months, respectively (from one thousandth of a milligram hypodermically to one-half a milligram, administered hypodermically in 1 case and by mouth in the other); in 1 case 300 times in $1\frac{1}{2}$ months (from one hundred-millionth of a milligram to three millionths of a milligram by mouth); in 1 case 160 times in $5\frac{1}{2}$ months (from one hundredth of a milligram to one and six-tenth milligrams by mouth); in 2 cases 100 times in 17 days and 1 month, respectively, (in the former from one thousandth to one-tenth of a milligram hypodermically and in the latter from one ten-thousandth to one hundredth of a milligram by mouth); in 2 cases 50 times in 24 days and 7 weeks respectively (in the former from one millionth to one twenty-thousandth of a milligram by mouth and in the latter from one hundred-thousandth to one two-thousandth of a milligram by mouth); in one 20 times in 18 days (from one hundred-thousandth to one five-thousandth of a milligram by mouth); and in one case 10 times in 13 days (from one hundredth to one-tenth of a milligram by mouth).

Three patients had no intracutaneous tests made after the treatment was begun. In 3 of the others the dose producing the minimal cutaneous reaction at the last test made, corresponded exactly with the dose being taken therapeutically at that time, being one hundredth of a milligram in two and one-tenth of a milligram in one. The dose being taken therapeutically was smaller than that producing the minimal reaction at the last test in 3 cases, being one hundredth of it (three millionths of a milligram) in one case, one-third of it (three hundredths of a milligram) in one case, and half of it (one two-thousandths of a

milligram) in one case. It was greater than the smallest reacting test dose in 10 patients. In one it was twice as large, being one fifth of a milligram. In 2 it was 5 times as large, being one twenty-thousandth of a milligram in one and one-twentieth of a milligram in the other. It was 10 times as large in 4, being one-hundredth of a milligram in 3 and one-tenth of a milligram in 1. In one case it was 30 times as large, being three hundredths of a milligram; and in two it was fifty times as large, being half a milligram.

No reaction of any kind followed the administration of tuberculin in 14 cases. In the other 5 most of the doses were not followed by a reaction, but in four favorable reactions were noted after some of the doses and in one an unfavorable reaction after one dose.

The periods over which tuberculin was administered to these 19 patients varied from 1 to 21 months, being between 1 and 2 months in 2 cases, between 3 and 4 months in 1 case, between 4 and 5 months in 1 case, between 5 and 6 months in 2 cases, between 6 and 7 months in 1 case, between 7 and 8 months in 2 cases, between 8 and 9 months in 3 cases, between 9 and 10 months in 1 case, between 10 and 11 months in 1 case, between 14 and 15 months in 1 case, between 15 and 16 months in 1 case, between 16 and 17 months in 2 cases, and between 21 and 22 months in 1 case.

There was improvement of the general condition in 11 patients during the tuberculin treatment, in 1 of these but slightly. None became worse. There seemed to be no noticeable change in 5. In 3 my notes are insufficient to permit of an opinion.

The temperature during the course of tuberculin treatment was reduced in 13 cases, in 10 of them to the normal. It was increased in 1 and unaffected in 5.

The pulse was reduced in 4 patients during the course of tuberculin treatment, to normal in 2. It was increased in 3 and unaffected in 12.

Seventeen of the patients gained in weight during the tuberculin treatment and 2 remained the same. None lost. The gains varied from 1 to 22 pounds. One gained between 1 and 2 pounds, 1 between 2 and 3 pounds, 2 between 3 and 4 pounds, 2 between 4 and 5 pounds, 1 between 5 and 6 pounds, 1 between 6 and 7 pounds, 1 between 8 and 9 pounds, 2 between 9 and 10 pounds,

1 between 10 and 11 pounds, 1 between 12 and 13 pounds, 1 between 14 and 15 pounds, 1 between 16 and 17 pounds, and 1 gained between 21 and 22 pounds.

SUMMARY

Failure of tuberculin treatment is probably due to inability to determine the appropriate dose for the individual patient, which may be one millionth of a milligram in one patient and one-tenth of a milligram in another of apparently the same type, owing to wide differences in tuberculin hypersensitiveness and tuberculin tolerance. The usual method of giving all patients practically the same initial dose does harm to those who should take less and is ineffectual in those who require more. The correspondence between tuberculin hypersensitiveness and tuberculin tolerance suggests the determination of the therapeutic dose for each patient as the amount of tuberculin that gives the minimal reaction when injected in that patient intracutaneously. The success of this method in children has been demonstrated in 19 cases here reported, whose initial doses varied from one hundred-millionth to one hundredth of a milligram and were increased 10 times to 120,000 times over periods of from one to twenty-one months, practically without producing an unfavorable reaction in any. A large proportion showed improvement in general condition, reduction of temperature and gain in weight.

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acidosis

EPIDEMIC ACID INTOXICATION

(Acidosis—Parke's Syndrome.)

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This paper is merely a note on the treatment of epidemic acid intoxication. No reference is here made to the etiology of this condition, or to the voluminous and valuable contributions which in the past few years have added so much to our knowledge of the abnormal metabolism underlying this condition.¹

I think that all pediatricians at the present time believe that there is a rather definite and dangerous syndrome characterized by intoxication with organic acids, which occurs not infrequently, especially during the winter months, in epidemic form, and which is most commonly seen between the ages of 1 and 3 years. It is my opinion also that most writers believe that this syndrome differs materially, in its etiology and treatment, from the so-called cases of acidosis of the recurrent vomiting type, which occur in older children, as well as from the so-called cases of acidosis which occur so frequently in acute infectious diseases, diabetes, and acute gastrointestinal disorders. Severe diarrheas, intestinal intoxications, and gastric disturbances, which may produce acetone and diacetic acid in the urine, are preeminently summer complaints, while epidemic acid intoxication is comparatively infrequent during the summer months.

The syndrome of epidemic acid intoxication was very clearly described by Thomas D. Parke² and myself³ and since has been very frequently described by other writers.

Symptomatology.—This syndrome commonly begins with anorexia, nausea, and vomiting. The vomiting and extreme nausea do not, however, commonly persist for more than 1 or 2 days, and not infrequently disappear within 12 or 24 hours. During this time, however, nausea and vomiting may be persistent

¹In the Medical News, Oct. 25, 1902, in a paper entitled "Comparative Toxicity of Ammonium Compounds," I discussed the subject of acid intoxications, in which I suggested that the possible etiology of this symptom group might be due: 1. To the loss of alkalies in the blood and tissues. 2. To the poisonous action produced by the bases which carried the acids through the blood to their excretion by the kidneys. 3. To the direct poisonous action of the acids themselves. In later papers I discussed the possibility of the symptom group being produced by a perverted liver function caused by the acidosis.

²Thos. D. Parke, Jour. A. M. A., 1910, p. 991.

³B. K. Rachford, "Diseases of Children," 1912, p. 255.

and severe. In many of these cases, after the second day the stomach begins to retain food and medication, and continues to do so throughout the course of the disease. In a few cases, however, the vomiting may persist to the end.

Almost coincident with the nausea and vomiting, the acetone odor in the breath is noted, and the acetone bodies appear in the urine. The acetone and diacetic acid in the urine very rapidly increase in quantity, and in the fatal cases commonly persist to the end. In a small majority of the fatal cases, towards the close of the disease, the urine becomes scanty and acetone and diacetic acid disappear.

The temperature in these cases is commonly above normal. Some cases record very high temperatures reaching 105° and 106°. In other cases, even those which terminate fatally, the fever, which is present from the onset of the syndrome, disappears and the temperature may remain normal or subnormal to the end.

In the majority of cases there is, from the beginning, a rather marked intestinal fermentation manifesting itself in diarrhea. The discharges from the bowels are putrid in odor, and show other evidences of putrid fermentation. The urines in these cases show a marked excess of indican and indolacetic acid. The diarrhea, however, like the nausea, vomiting, and fever, may vary greatly in different cases. In some instances there is constipation, but even in these cases the discharges from the bowels, produced by a laxative, as a rule, are putrid in character, and contain mucus, and the urine shows an excess of indican and indolacetic acid. It is my belief that the gastrointestinal fermentation which is commonly, but not always present in these cases, is a symptom belonging to the syndrome and not the essential factor in producing the acidosis. A rather fair percentage of these cases occur in perfectly nourished, breast-fed infants under 1 year of age, and many of these breast-fed babies quickly succumb to this infection. If epidemic acid intoxication was simply one of the symptom groups of intestinal intoxication, it would be much more prevalent during the summer months, and would rarely occur in breast-fed infants.

Labored and rapid breathing is present in the majority of the cases, and is quite out of proportion to the elevation of temperature. This symptom is described by some writers as presenting the appearance of air hunger.

As the syndrome progresses, the child becomes more or less apathetic and lethargic; the stupor gradually increases, until the child fails to react to its surroundings and loses consciousness, dying in a profound coma.

There is nothing characteristic about the pulse in this condition. It is rapid from the beginning, and in the cases that progress to a fatal termination, the pulse may reach 150 or 200, and show intermittency.

In many of these cases there is a marked rigidity with tendency to retraction of the abdominal muscles, and not infrequently there is rather marked rigidity and tenderness in the right hypochondrium in the region of the liver. The liver, in many of these cases, is enlarged and extends 1 or 2 inches below the free margin of the ribs. In a few cases bile was found in the urine, and the conjunctivae and skin were slightly jaundiced.

Such, in brief, is the syndrome of epidemic acid intoxication.

This syndrome, which has been observed for many years in comparatively limited epidemics, has been rather wide-spread during the past winter, occurring in many cities of the United States, and has been more severe in Cincinnati than ever before. During one week I saw in consultation 7 fatal cases of this disease.

Treatment.—My experience, during the past winter, has convinced me that bicarbonate of soda *in large doses* is of no value. All of the fatal cases which I saw had been given bicarbonate of soda in large doses. In some of these cases the urine became alkaline under the bicarbonate of soda treatment, but the diacetic acid and acetone in the urine persisted.

After a rather wide experience in the treatment of this syndrome, I not only became skeptical as to the value of bicarbonate of soda, but I gradually came to believe that in some of these cases it probably had a deleterious effect, and I am still of the opinion that bicarbonate of soda in large doses, given intravenously and otherwise, may help to bring about a fatal result.

Early in the epidemic I became so convinced that bicarbonate of soda was of no value, that I gave up the use of it, and since then I have been firmly convinced that I have gotten better results without bicarbonate of soda than with it. I do not wish to advance the theory that *small doses* of bicarbonate of soda in these

cases are dangerous, but it is still an open question in my mind as to whether small doses of bicarbonate of soda are of value in the treatment of this condition. I wish simply here to register my opinion, based upon clinical observations, that the generally accepted opinion that large doses of bicarbonate of soda in these cases is the all important method of treatment is fallacious.

The line of treatment which I finally adopted, and which I believe gave me good results, is as follows: In the first place it is most important to clear the intestinal canal as soon as possible. To accomplish this the colon should be thoroughly irrigated with physiological salt solution, and, as soon as the stomach can retain medication, castor oil, milk of magnesia in good-sized doses, or some other saline laxative should be given. Throughout the treatment of this condition, cathartic medication should be repeated, if necessary to clear the intestinal canal of mucus and fermenting material.

I also believe that physiological salt solution given hypodermically or intravenously is of great value in the treatment of severe cases especially those where the exhaustion is great and where fluids are not retained by the stomach.

Following the cathartic medication the Bulgarian bacillus in some form should be given, and this should be continued in fair sized doses until the child is convalescent.

The dietetic treatment in these cases is all important. In beginning the treatment, when the anorexia is marked and the stomach is irritable, it is important to let the stomach rest. During this period of the disease, when the stomach will not retain food, glucose or dextrose solution should be given by the rectum, and, in some instances it may be necessary to give these solutions hypodermically or intravenously. But, in the great majority of cases, by the second day it will be found possible to give certain foods and medication by the mouth. Then the glucose solution may be given by the mouth, and later a teaspoonful of one of the thick malt extracts, preferably maltine, should be given every 4 hours, and as soon as possible, cereals, such as strained oatmeal and barley, should be added to the diet. Cane sugar may be used in sweetening the cereals. In many of these cases, before beginning the use of cereals, Nestlé's food and malted milk may be given. These foods are readily retained by the stomach and are most valuable in the treatment of this syndrome. They

should be given as soon as possible and continued until the child is convalescent. As early as possible orange juice should be given in small quantities. If it is retained it is important it should be given in larger quantities, diluted with sweetened water or mixed with gelatine and continued throughout the course of the disease. It is important that milk, fats and albuminous foods in all forms should be omitted from the diet until the child is safely convalescent.

The dietetic treatment as above outlined must necessarily vary with the age and condition of the individual patient. Under this treatment the diacetic acid and acetone in the urine should gradually diminish until they finally disappear and the urine becomes normal.

The satisfactory way in which these cases progressed under this treatment to a final recovery may have been a coincidence, but my experience leads me to believe that if bicarbonate of soda be dispensed with or given only in very small quantities, and the above line of treatment followed, satisfactory results will be obtained.

SKIN TUBERCULIN REACTION IN CHILDREN (Nourisson, Jan., 1920). Germaine Mioche states that on the basis of experience gathered during five years in Marfan's service, the following conclusions may be drawn as to the clinical value of the tuberculin skin reaction: 1. It is the procedure of choice among the various diagnostic methods in which local reactions to tuberculin play a part. 2. Its diagnostic value is incontestable. 3. Starting with zero in the newly born, the number of positive cutireactions increases progressively with the age of the subject. 4. In children under 1 year of age a positive reaction is a sure indication of progressing tuberculosis and usually of approaching death. In older children it is not a reliable index of tuberculosis in evolution unless supported by clinical evidence; and in adults its diagnostic value is practically zero. 5. As a method that will permit the examining physician to diagnose tuberculosis in infants it is incomparably better than all others, for by means of it he can recognize the presence of the disease at its very onset and thus perhaps be able to render some service.—*Journal A. M. A.*

injection

INTRAPERITONEAL ADMINISTRATION OF SODIUM BICARBONATE SOLUTIONS*

(Preliminary Report)

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The problem that confronts the physician in cases of gastrointestinal disorders, where diarrhea and vomiting persist, resulting in rapid losses of fluid from the body, is to find a quick and efficacious method of replacing the lost fluids. Dehydration of the tissues and the consequent loss of weight constitute the most imminent dangers to the life of the child. The enormous mortality rate resulting from these maladies is caused, not by the toxins produced but by the rapid loss of fluid from the body, and the correction of this condition is therefore of the utmost importance.

The maintenance of a constant water concentration within the body will not only relieve many symptoms that are of bad prognostic import, but also may alter the entire course of the disease, and the outcome, as far as the life of the patient is concerned. The immediate restoration of the water balance of the body will exercise its beneficial effects in the following ways:

- 1st. By enabling the organism to better utilize its reserve energy.
- 2nd. By dilution of the possibly toxic factors existing in the body.
- 3rd. By relieving the high concentration of the blood that results from the persistent loss of fluids, i.e., by increasing blood volume and blood flow.
- 4th. By its favorable effect on the temperature curve.
- 5th. By increasing the urinary output.
- 6th. By increasing the general comfort of the patient.

The administration of fluids by means of the normal channel (the mouth), in the face of incessant vomiting, is difficult; to supply water per rectum by the "Murphy Drip" method, in the presence of a profuse diarrhea, is impossible. We have, therefore, to search for other routes equally efficient.

A realization of the importance of a simple and successful method for the parenteral administration of fluids has led to much research work during the past few years in the effort to find easily available and efficient parenteral routes, work that had been attended with considerable success. Not only are parenteral routes

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being used for the purpose of restoring fluids to the tissues, but also to carry nutrition to the body as well as various medications.

The parenteral administration of fluids can be carried out in the following 3 ways:

- 1st. Subcutaneously.
- 2nd. Intravenously.
- 3rd. Intraperitoneally.

The application of these methods in the gastrointestinal disorders of infancy and early childhood comprises:

- (a) The administration of water in the form of normal saline solution.
- (b) Nourishment in the form of glucose.
- (c) Medications, as sodium bicarbonate, to overcome symptoms of acidosis.

The Subcutaneous Route is the route most commonly employed for the introduction of normal saline solution into the body. Its simple technique, its comparative freedom from danger, and the fact that it can be administered at frequent intervals by the attending nurse, have made it the method of choice. A glucose solution of 5 per cent. strength can be given subcutaneously in the same manner as saline. This can be given in solution with normal saline or by itself, according to the indications present. Sodium bicarbonate can be given subcutaneously in solutions of 2 to 4 per cent. strength. However, if the sodium bicarbonate solution has been sterilized by heat, there is some danger that necrosis of tissue will result, inasmuch as the process of heating transforms some of the bicarbonate into the irritant carbonate. To minimize this danger Howland and Marriott¹ advise the bubbling of carbon dioxide through the cold sodium bicarbonate solution, to which a few drops of phenolphthalein have been added, until it becomes colorless. With proper precautions the solution may also be prepared by simply dissolving the sodium bicarbonate in sterile water, since it has been proven that sodium bicarbonate in bulk is sterile.

Results from the subcutaneous method may be disappointing, however, owing to the fact that absorption from the subcutaneous tissue is too slow to meet the emergency, especially in patients that are in a moribund condition.

The Intravenous Method is undoubtedly the quickest and the most efficient method of obtaining therapeutic results, since the

solution is thrown directly into the circulation. In infants the longitudinal sinus is more accessible for that purpose than any other large vein because of its wide, incollapsible lumen and constant position. Marfan, in 1898, was the first to administer saline by way of the longitudinal sinus. Since then the sinus has been used for the administration of glucose and sodium bicarbonate as well as therapeutic agents, such as salvarsan, diphtheria antitoxin and various sera. It is also used for obtaining blood for chemical and bacteriological examination and for transfusion in the hemorrhagic diseases of the new born. The chief disadvantage of this method is that the quantity of the solution used must be limited, in order not to throw a great burden on the circulation. Also in older children where the fontanel is closed, thus eliminating the route of the longitudinal sinus, the intravenous method is next to impossible on account of the technical difficulties of entering the vein.

The Intraperitoneal Method consists in the injection of fluid through a needle introduced into the peritoneal cavity. Surgeons have long recognized the power of absorption possessed by the peritoneum, and have made frequent use of it by introducing large quantities of saline into the peritoneal cavity before closing it, as a means of combating shock or serious loss of blood. However, they ventured to do so only when having the advantage of an open peritoneal cavity before them; otherwise preference was given to the subcutaneous or intravenous method.

The technique of thrusting a needle into the peritoneal cavity and the direct injection of saline solution through it, is first reported by Blackfan and Maxey² in 1916, who also report that this procedure has been used by Professor Garrod at St. Bartholomew's Hospital, London. No other reference to this method has been found in the literature. More accurate data regarding the absorptive power of the peritoneum are furnished by Dandy and Rountree³, of Baltimore. After injecting phenolsulphonaphthalein into the peritoneal cavity in order to determine the route of absorption, they come to the following conclusions:

- 1st. There is very rapid absorption of fluids from the normal peritoneal cavity.
- 2nd. The absorption is essentially by the blood stream and not by the lymphatics.

3rd. The time of appearance of the phenolsulphonephthalein in the blood is from 2 to 4 minutes, and in the urine 4 to 6 minutes.

4th. The quantitative output in the urine is from 40 to 60 per cent. in 1 hour.

Adler and Meltzer⁴ have injected Prussian blue into the peritoneal cavity of animals and they found that 30 per cent. of the fluid was absorbed in 40 minutes, and that the Prussian blue appeared in the urine in 30 minutes.

Shipley and Cunningham⁵, in their experiments on absorption from the peritoneal cavity, come to the conclusion "that there is very active absorption of foreign fluids through the peritoneal blood vessels, not only through those in the omentum, but also through those beneath the peritoneum of the gut and bladder. Absorption of fluids takes place not only through capillaries but through vessels of quite large caliber, and through arteries as well as veins." Concerning damage to the omentum, they come to the conclusion that there is none. This they demonstrated by immersing the omentum in foreign fluids, the omentum showing thereafter no exudation or hemorrhages and no signs of cellular disturbances.

A. E. Hertzler⁶ says: "Generally speaking, if the amount of the fluid injected into the peritoneal cavity does not exceed 10 per cent. of the body weight, 30 per cent. of the fluid injected will be absorbed in the first half hour, and at the end of 2 hours, less than 30 per cent. will remain."

Blackfan and Maxey² relate the following: "In a moribund patient 200 c.c. of saline was injected intraperitoneally. The patient died 6 hours later. At the necropsy only 50 c.c. of the solution was recovered."

The experiments and observations of the above mentioned authors go to prove beyond doubt the remarkable absorptive power possessed by the peritoneum. That the procedure of intraperitoneal injection of fluids is practically free from any danger of puncturing the bowels or carrying infection into the peritoneal cavity, my work with this method on animals, and on a number of children in the pediatric ward of Mt. Sinai Hospital has substantiated. It therefore seemed of interest to determine whether the intraperitoneal route could not be used for the administration of sodium bicarbonate in cases of acidosis as

seen in infants mainly during the summer months, and with this end in view, experiments with rabbits were begun by me in the summer of 1918 and continued during the summer of 1919. The uniformly successful results of these experiments are shown by the following protocol. The acidity or alkalinity of the urine was determined by titration, either with decinormal NaOH or with decinormal HCl, according to the reaction.

PROTOCOL.

Rabbit No. 1—Weight, 2,900 grams.

August 25, 1919. Given intraperitoneal injection of 85 c.c. of 2 per cent. sodium bicarbonate solution through which CO₂ had been bubbled until the pink color of phenolphthalein disappeared. Urine passed 30 minutes after injection distinctly acid.

August 26, 10 A. M., 85 c.c. of the same solution injected. Urine passed immediately after injection distinctly alkaline.

August 26, 2 P. M., 85 c.c. of the same solution injected. Alkalinity of urine passed 14 hours after injection, 0.8 decinormal HCl.

August 27, 10 A. M., 85 c.c. of the same solution injected. Urine passed immediately after injection alkaline, 1.1 decinormal HCl. Urine passed 7 hours after injection acid, 0.1 decinormal NaOH.

August 27, 6 P. M., 85 c.c. of the same solution injected. Urine passed on the following morning alkaline, 0.3 decinormal HCl.

August 28, 10 A. M. Animal killed. Autopsy performed by Dr. Wahl. No evidence of infection at site of injection. Subcutaneous tissue showed some edema with slight bluish discoloration. Peritoneal surface smooth, moist and glistening. The peritoneal fluid, although increased, did not exceed 20 c.c. in amount; in character it was slightly turbid. Vessels of bladder and intestine slightly injected, otherwise normal. A slight hematoma present in the left psoas muscle. Liver, heart, lungs, adrenals, kidneys, and pancreas, normal. Urine in bladder acid, 0.3 decinormal NaOH. Cultures negative.

Conclusion. This rabbit received 5 intraperitoneal injections in the short period of 3 days. The urine changed rapidly from a distinctly acid reaction to an alkaline reaction. No abnormalities were shown by the autopsy except a slight injury to the psoas

muscle (due to the animal being insecurely held during an injection). The turbidity of the fluid was due to an increased cell count, caused by the above mentioned irritation.

Rabbit No. 2—Weight, 2,500 grams.

August 27, 1919. Given intraperitoneal injection of 60 c.c. of 2 per cent. sodium bicarbonate solution, treated with CO_2 in the manner described above. Urine passed a few minutes after injection acid, 0.1 decinormal NaOH. Urine passed 18 hours after injection alkaline, 0.2 decinormal HCl.

August 28, 60 c.c. of the same solution injected. Urine passed immediately after injection acid, 0.2 NaOH.

August 29, 60 c.c. of the same solution injected. Urine passed immediately after the injection acid, 0.1 decinormal NaOH.

August 30, 60 c.c. of the same solution injected. Urine passed 1 hour later alkaline, 1.0 decinormal HCl. Urine passed 6 hours after injection alkaline, 0.5 decinormal HCl.

September 4. Rabbit had been entirely normal in behavior and appearance. On this date animal killed. Autopsy completely negative.

Conclusion. This rabbit received 4 intraperitoneal injections of a 2 per cent. sodium bicarbonate solution, 1 on each of 4 consecutive days. No ill effects followed and no signs of infection or irritation accompanied these experiments. The resulting alkalinity of the urine was apparently maintained for a period of only 1 to 6 hours, the urine being again acid in reaction after 24 hours.

Rabbit No. 3—Weight, 2,600 grams.

August 26, 1919. Urine before experiment acid, 0.1 decinormal NaOH.

August 27, 1919. Urine before experiment acid, 0.4 decinormal NaOH.

August 27, 1919. Urine before experiment acid, 0.1 decinormal NaOH.

August 28, 1919. Urine before experiment acid, 0.1 decinormal NaOH.

August 28. Given intraperitoneal injection of 70 c.c. of a 2 per cent. sodium bicarbonate solution. Urine passed 1 hour later, alkaline, 0.2 decinormal HCl.

August 29. 70 c.c. of the same solution injected. Urine passed immediately after injection, 0.1 decinormal NaOH.

August 30. Urine in the morning previous to the time of making another injection, alkaline, 0.4 decinormal HCl.

August 30. 70 c.c. of the same solution injected. Urine passed 3 hours after injection acid, 0.4 decinormal NaOH. Urine passed 5 hours after injection, alkaline, 0.4 decinormal HCl.

September 4. Animal sacrificed. Autopsy performed immediately by Dr. Wahl, who made the following report: "On removal of skin of abdomen there is no evidence of a peritoneal puncture except a faintly congested area 2 cm. in length in left lower quadrant. Slight ecchymosis below costal margin. Peritoneum smooth and glistening. Vessels of small intestine slightly congested; large intestine normal. No excess of fluid in the peritoneal cavity. A yellowish mass of tissue suggesting fat could easily be stripped off the bladder, leaving a slightly granular surface. Heart, lungs, spleen, kidneys, and adrenals, normal. Liver normal except for a few white nodules that look like coccidiosis. Cultures negative."

Conclusion: This animal received 3 intraperitoneal injections of sodium bicarbonate solution, 1 on each of 3 consecutive days with no ill effects on its peritoneal cavity. The reaction of the urine, which, as shown by titration on 4 successive days preceeding the first intraperitoneal injection of bicarbonate solution, was definitely acid, was changed to alkaline by the injection.

Rabbit No. 4.—Weight, 2,240 grams.

August 29, 1919. Given intraperitoneal injection of 75 c.c. of 2 per cent. sodium bicarbonate prepared in the manner above described. Urine passed immediately after injection alkaline, 0.1 decinormal NaCl. Urine passed 5 hours later alkaline, 0.4 decinormal HCl. Six hours later animal given another intraperitoneal injection of 75 c.c. of the same solution.

August 30. Urine at 8 A.M. alkaline, 0.3 decinormal HCl. 75 c.c. of the same solution were then injected intraperitoneally. Four hours later another 75 c.c. of the same solution were injected. Three hours later another injection of the same amount was made. Urine after the last injection was alkaline, 0.7 decinormal HCl. This animal was not killed but remained well and lively during the following month, after which it was transferred for other experimental purposes.

Conclusion: This animal received 5 injections within a period

of 36 hours, at intervals as short as 3 hours, with no bad results. The urine again showed a constant increase in its alkalinity.

Rabbit No. 5.—Weight, 1,760 grams.

October 20, 1919. Given intraperitoneal injection of 100 c.c. of a 2 per cent. solution of sodium bicarbonate sterilized under pressure but not treated previously with CO_2 .

October 21. 100 c.c. of the same solution injected.

October 22. 100 c.c. of the same solution injected.

October 23. 100 c.c. of the same solution injected.

October 24. 100 c.c. of the same solution injected.

October 26. Animal killed. Autopsy findings completely negative.

Conclusion: This animal received 5 injections on consecutive days of a sodium bicarbonate solution sterilized and not treated with CO_2 with no ill effects.

Rabbit No. 6.—Weight, not given.

October 21, 1919. Given intraperitoneal injection of 100 c.c. of a 2 per cent. sodium bicarbonate solution sterilized under pressure but not treated with CO_2 .

October 24. 100 c.c. of the same solution injected.

October 26. 100 c.c. of the same solution injected.

Animal remained well during observation of 1 month following.

Conclusion: As in the previous experiment on rabbit No. 5.

Rabbit No. 7.—Weight, 1,800 grams.

August 15, 1919. Given intraperitoneal injection of 75 c.c. of a 5 per cent. solution of sodium bicarbonate sterilized by boiling and treated afterwards with CO_2 .

August 16. 75 c.c. of the same solution injected.

August 17. 75 c.c. of the same solution injected.

August 18. 75 c.c. of the same solution injected.

August 19. 75 c.c. of the same solution injected.

August 20. 75 c.c. of the same solution injected.

August 21. 75 c.c. of the same solution injected.

August 24. 75 c.c. of the same solution injected.

August 25. Animal killed. Autopsy findings entirely negative.

Conclusion: The injection of a sodium bicarbonate solution

of even 5 per cent. strength into the peritoneal cavity produces no bad effects.

Rabbit No. 8.—Weight, 1,900 grams.

August 17, 1919. Given intraperitoneal injection of 100 c.c. of a 5 per cent. sodium bicarbonate solution sterilized by boiling and treated afterwards with CO_2 .

August 19. 100 c.c. of the same solution injected.

August 21. 100 c.c. of the same solution injected.

August 23. 100 c.c. of the same solution injected.

August 25. 100 c.c. of the same solution injected.

August 27. 100 c.c. of the same solution injected.

August 29. Animal killed. Autopsy findings negative. Cultures negative.

Conclusion: The same as with Rabbit No. 7.

GENERAL CONCLUSIONS.

1st. The intraperitoneal route can be used for the administration of sodium bicarbonate.

2nd. The results of the injections were the same whether the solutions of sodium bicarbonate were treated with CO_2 or not.

3rd. A solution of sodium bicarbonate of a strength of 5 per cent. can be used, although it is probably advisable to use a 2 per cent. solution, which is isotonic with the blood.

Since the results of this work on the intraperitoneal injection of sodium bicarbonate solutions in rabbits have been made known to a number of the leading pediatricians of the city, the procedure has been applied to infants with gratifying success.

Unfortunately for the work of the author (though fortunately for the babies) the last summer was mild and a true case of acidosis a rarity. There was therefore no opportunity for the application of this method in the ward at Mt. Sinai. Other hospitals in the city, whose records are at my disposal, used this method of administering sodium bicarbonate as a routine one in their cases of acidosis, and in a series of cases treated at Lakeside Hospital, in the service of Dr. H. J. Gerstenberger, there was an unusually high percentage of recoveries, while autopsies on cases that did not recover failed to show any pathological effects of the procedure. The number of cases is, however, too small to permit of statistical deductions. At a somewhat later date, therefore, a

more detailed report in regard to the clinical use and effectiveness of the method will be made from case records.

The acknowledgments of the author are due to Dr. H. C. Wahl for the careful autopsies made by him in connection with the experiments that are the subject of this report.

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DIARRHEA IN BREAST-FED INFANTS (Nourrisson, Jan., 1920).

A. B. Marfan states that while diarrhea in breast-fed infants is frequent, in its primary form it is almost never associated with symptoms of infection or intoxication, at least not so as to present any serious or lasting symptoms. It has no profound effect on the nutrition, and is very rarely of a grave nature. He opposes the idea advanced by many that diarrhea in breast-fed infants frequently requires that the child should not be given the breast for a time; he thinks that such indications are rare. Nor does he think that a change of nurse is often indicated. In the foregoing respects a radical distinction is to be made between breast-fed and bottle-fed infants, for the general nutrition and growth of the latter are quickly affected by diarrhea; hypothrepsia and athrepsia often result; toxic complications (cholera infantum) or secondary infections may arise requiring varied and rather complicated dietetic treatment. In breast-fed infants, if the diarrhea is light, the first day the intervals between feedings should be lengthened and the time at the breast should be shortened. The intervals may be lengthened to four hours and the time at the breast may be reduced to five or six minutes. During the intervals the infant should be given a few spoonfuls of pure boiled water. The second day the intervals are shortened somewhat; the third day the time at the breast may be slightly lengthened. Thus, by degrees, according to the effect secured, a gradual return to normal is brought about. But in severe cases three or four feedings are entirely suppressed and pure boiled water is substituted, a quantity about equal to the amount of milk usually taken by the child when well.—*Journal A. M. A.*

Infant

CYANOSIS IN THE NEW BORN.*

By FRANK COHEN, M.D.

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Cyanosis in the new born is a very important sign because its presence often indicates a serious pathological process, one which often requires measures of immediate relief. So evidently prominent is this symptom that in differential diagnosis of the various maladies of the new born in which it appears, it would be highly beneficial to depart from the usual custom of discussing it as a concomitant symptom under various diseases, and to discuss it as an entity in itself. By thus classifying around it the conditions in which it occurs, we could more easily recognize the salient features of each.

Cyanosis has recently¹ been shown to follow a condition of increased oxygen unsaturation in the peripheral capillaries. Oxygen unsaturation is defined as the difference between the oxygen in the venous blood and the total amount of available oxygen in the blood. When there is no condition present to prevent complete oxygen saturation of the blood in the lungs, cyanosis will not appear before the venous oxygen unsaturation is at least 13 or 14 volumes per cent. With any condition that does prevent complete oxygen saturation of the blood in the lungs, cyanosis will appear with a less amount of venous oxygen unsaturation.

There are factors in the etiology of cyanosis in the new born not present in the older child. Cyanosis occurs in the new born because of (1) the character of the labor, (2) an abnormal developmental process, (3) sepsis.

1. *Character of the Labor.* Cyanosis follows any condition bringing about asphyxia neonatorum, such as prolonged labor, cord about the neck, premature separation of the placenta, placenta previa, prolonged anesthesia during labor, the asphyxia of the new born of twilight sleep, or that following pituitrin, and in intracranial or cerebral hemorrhage. The preceding delivery history should make the diagnosis clear. In all but hemorrhage the cyanosis passes away with the successful treatment of asphyxia. The additional features of intracranial hemorrhage would be: Pallor, irregular and shallow respirations, unwillingness to nurse and facial edema. There may be signs of compression, bulging fontanel, slow pulse, twitchings or convulsions, paralysis.

*Read before the Pediatric Section, Jackson County Medical Society, April 12, 1920.

¹ Lundsgaard, C. Studies of Cyanosis, J. Exper. M. 30:259 Sept., 1919.

Lumbar or subdural puncture may help in the treatment as well as in making the diagnosis.

2. *Developmental Causes of Cyanosis.* These are: (a) Pulmonary atelectasis. (b) Congenital heart defects. (c) Thymus hyperplasia. (d) Diaphragmatic hernia, and other rare congenital anomalies.

(a) *Pulmonary Atelectasis.* Cyanosis will be present in an infant weak from prematurity or any cause, for instance congenital syphilis. The amount and duration of cyanosis depends upon the extent of lung space involved and the frequency and duration of the attacks of apnea. Absence of respiratory murmur may be elicited. Differences of percussion are difficult to note.

(b) *Congenital Heart Defects.* The cyanosis of congenital heart disease may not appear for many weeks or even years after birth. While cyanosis may not be as often present as is generally supposed, on the other hand it is often the only sign that directs attention to the underlying condition.

The diagnosis of congenital heart defect usually rests on the presence of a murmur. But one must remember that a cardiac murmur may not be abnormal during the first week of life. It can disappear at this time with the closing of the foramen ovale and the ductus arteriosus. But a murmur and cyanosis point very strongly to the presence of a cardiac defect.

In uncomplicated patent foramen ovale, ductus arteriosus or defective interventricular septum, although there is an admixture of arterial and venous bloods, cyanosis may be absent; or it may occur only at times with dyspneic attacks. In these patients the blood receives complete oxygen saturation in the lungs; the venous blood unsaturation must be at least 13 or 14 volumes per cent. to produce cyanosis.

In the rarer anomalies, biloculate or triloculate heart, with a freer mixing of bloods, there is more cyanosis.

But the extreme grades of cyanosis appear in pulmonary obstruction, in cases of pulmonary stenosis or atresia, and the transposition of great vessels. Pulmonary stenosis has besides extreme cyanosis, a systolic murmur and enlargement of the heart. Those cases that are not rapidly fatal have an accompanying defect, defective septum, or open ductus. In the latter there would be extreme cyanosis, murmur transmitted to carotids or the so-called "humming top" murmur.

In cases of transposition of great vessels—arterial trunks—the cyanosis is extreme, but there is no murmur to draw one's attention to a cardiac anomaly. However, in the normal infant the inner third of the clavicular region on the left side shows a slight dullness as compared to the right side. As this dullness is due to the great vessels, in suspected transposition one should look for such dullness on the right side.

The end result of cyanosis is polycythemia, an increase of red blood cells, an attempt by nature to compensate by using more blood surface for aeration. This, in fact, is a detriment, as the lower water content allows the cells to circulate more closely, obstructing the vessels still further. Lundsgaard has pointed out that there are states of polycythemia that do not show the oxygen unsaturation features of a true cyanosis; in fact, the skin has a reddish hue rather than bluish. He calls this erythrosis, or false cyanosis.

(c) Thymus Enlargements. At birth, the mechanical interference with respiration by an enlarged thymus appears to be a more important element than a state of so-called status lymphaticus. In the former case because there is not complete oxygen saturation of the blood in the lungs, cyanosis appears with less than 13 or 14 volumes per cent. oxygen unsaturation of venous blood.

This type of baby is often chubby and short necked. The cyanosis may be intermittent, coming on with attacks of dyspnea or it may be present continuously. Inspiratory stridor is often present. There may be convulsions. Percussion reveals increased areas of dullness on either side of the sternum. This may be made more manifest by bending the child forward. The x-ray can aid materially in the diagnosis.

(d) Diaphragmatic Hernia. Cyanosis may occur in the rarer congenital anomalies, but in diaphragmatic hernia it is a prominent and persistent symptom, because of the marked interference with lung expansion. There is an extreme grade of cyanosis and dyspnea. The condition should be strongly suspected when there are in addition signs of cardiac displacement, absence of murmurs, absence of pulmonary resonance on one side. The x-ray will show abdominal contents in the thorax with displacement of the lung.

Congenital goiter and lymphangioma are rare anomalies. When either causes cyanosis its diagnosis would be facilitated by the very size necessary to produce pressure in the neck on respiratory organs, or interference with the circulation.

3. *Sepsis*. While cyanosis may be a prominent symptom in infectious cases, there will be present either signs of peritonitis, pneumonia, arthritis, osteomyelitis, septic conditions due to cord infections, etc., features distinctive in themselves.

Cyanosis may take the place of rigors, just as in older children Winckel's Disease, which is probably of septic origin, is an exception to the above in not having any rise in temperature. However, with extreme prostration, cyanosis will be accompanied by the other pathognomonic signs of hemoglobinuria and jaundice.

CONCLUSION: In view of the fact that there are distinctive factors in the etiology of cyanosis in the new born, a classification of these cyanotic conditions has been made. These conditions fall into the 3 main groups of (1) Labor processes, (2) Abnormal developmental processes, and (3) Sepsis.

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TARDY OSTEOPERIOSTITIS WITH INHERITED SYPHILIS (Revista Critica di Clinica Medica, Oct. 25, 1919). A. Varisco reports the case of a young woman who had been apparently healthy, except for a few convulsions in infancy, until measles at 18. At 20 she complained of pains in the legs and large joints, and the latter began to enlarge in a few weeks, with a low continuous fever and drowsiness. The spinal fluid seemed to be normal. Not until the end of six months did the symptoms subside so she could leave the bed. After a few months of slight ups and downs, painful tumors developed in the crest of the tibia and other long bones and the clavicles, and numerous glands enlarged. After nearly a year from the first symptoms, a tentative course of mercurial treatment not only cleared up the diagnosis—the previously negative Wassermann reaction veering to positive—but resulted in practically a cure. There was nothing in the family history to suggest syphilis except the shape of the patient's teeth and a certain pigmentation of the face.—*Journal A. M. A.*

CONGENITAL ATRESIA OF THE ESOPHAGUS*

By ALFRED L. KASTNER, M.D.

Milwaukee.

In a copy of Gibson's Anatomy, a favorite text book of the 17th century, Dr. William Thomas¹ quite by chance unearthed the following account: "About November, 1696, I was sent for to an infant that could not swallow. The child seemed very desirous of food and took what was offered it with greediness, but when it went to swallow it it was like to be choked, and what should have gone down returned by the mouth and nose and it fell into a struggling convulsive sort of fit upon it. It was very fleshy and large and was two days old when I was called to it, but the next day it died. The parents being willing to have it opened I took two physicians and a surgeon with me. On opening the abdomen first, the guts had some of the meconium remaining in them, though the child had gone two or three times to stool. The stomach had in it a pretty deal of slimy sort of liquor (or jelly rather) somewhat like this (strained) water-gruel. (I shall not mention any observations upon other parts of the abdomen as being not to our present purpose). Then we cut open the thorax and taking out the gullet with the wind-pipe, lungs, etc., continued to the stomach. Then we made a slit in the stomach and put a pipe in its upper orifice, and blowing, we found the wind had a vent, but not by the stop of the gullet. Then we carefully slit up the back side of the gullet from the stomach upwards, and when we had gone a little above half way towards the pharynx we found it hollow no further. Then we began to slit it open from the pharynx downward and it was hollow till within an inch of the other slit and in the imperforate part it was narrower than in the hollowed. This isthmus (as it were) did not seem to have been hollow, for in the bottom of the upper and the top of the lower cavity there was not the least print of any such thing, but the parts were here as smooth as the bottom of an acorn cup. Then searching which way the wind had passed when we blew from the stomach upwards we found an oval hole half an inch long, on the foreside of the gullet opening into the aspera arteria, a little above its first division just under the lower part of the isthmus above mentioned."

*Read before the Milwaukee Medical Society, February 24, 1920.

After all these years but little can be added to Dr. Gibson's account that would make for greater clearness or a better understanding of this anomaly. Though congenital atresia of the esophagus receives an unwarranted neglect in most text books, many authors have, especially in recent years, enriched the literature with accounts of the condition. Since Schoeller described several cases, in 1838, Mackenzie in 1884, Kreutzer in 1905, Cautley in 1917 and Brennemann^{2,3} in 1913 and 1918 and many others besides have reported and described cases in such numbers, one is forced to believe that this anomaly is not in reality a rare one. The striking feature of all these reports, as pointed out by Brennemann, is the preponderance of what has been called the inosculating type over all other malformations of a similar character. One might say that the particular type here described appears to be the only one that has obtruded itself for many years. Indeed as far as the description of the anomaly itself is concerned, excepting some very minor variations, all reports exhibit such a uniformity that it is with some hesitancy that I undertake to say more than, "I also have seen exactly such a case." However, a recapitulation appears justifiable when a condition has either an undeserved reputation for rarity or a most unaccountably irregular distribution and incidence. As stated by Brennemann, "Cautley reported a case in 1917, the first he had seen in 25 years of practice mainly among children and that in the child of a Belgian refugee." Brennemann himself reported 3 cases in 1913 which he had seen in the period of 1 year, and in 1918 reported 4 more cases.

Its clear cut, striking, not to say spectacular symptom-complex, it seems to me, could hardly fail to arouse interest when encountered, and incite study and investigation that would naturally result in eventual, if not immediate recognition. The charitable view then would be that these cases fall not with impartiality, but that like the malicious paper snow storm of the melodrama, they pursue the unfortunate up and down the stage and snow on him and on him alone. None the less, it will be just as well to remember that it is a human frailty to recognize most readily what is familiar—so this subject, perhaps with profit, may be opened again.

The theoretical explanations for the occurrence of this an-

omaly are hardly germane to the purely clinical and practical considerations and for a short discussion of the various theories Huntington's⁴ article can be recommended. It may be added that other anomalies accompany atresia of the esophagus in a large percentage of cases. More important is the consideration of the anatomical peculiarities of the anomaly, for by these are determined the symptoms, prognosis and treatment.

In the specimen before me, as in the diagrammatic figure which I have drawn to approximately life size, the upper and dilated part of the esophagus measures about 4 c.m. in length and has an almost uniform diameter of a little over 1 c.m. The lower blind, bluntly rounded extremity is about 1 c.m. distant from the bifurcation of the trachea. Its walls give the impression of being not simply stretched and dilated, but on the contrary seem thick and muscular.

In this particular specimen it is impossible to say whether a fibromuscular cord connects the upper portion of the esophagus with the lower or not. It would perhaps require a stretch of the imagination to find it. Such connecting cords have been found, however, and in Huntington's specimen cross sections showed the cord to be made up of striated muscular fibres and connective tissue. No trace of epithelial tissue was found. The presence or absence of the cord is of no clinical importance. It is only mentioned on account of its apparent absence in this particular specimen and its presence in others.

The lower portion of the esophagus takes its origin, or emerges from the posterior aspects of the trachea about $\frac{1}{2}$ c.m. above the bifurcation, and from this point widens itself gradually to the size of the normal esophagus of the new born, i.e., 5 m.m. It entered the stomach in the normal manner.

When the trachea is slit up and the tracheal opening of the lower portion of the esophagus exposed, it reveals itself as a small transverse slit with a little groove-like depression running upward on the internal posterior surface of the trachea, very much like the hole left in a board when an obliquely driven nail has been pulled out by a claw hammer. The shape of this opening, in spite of its smallness, strikes one as well adapted for both the entry and exit of fluids. It readily admits the small-sized silver probe. Some specimens have been described in which the lower portion of the esophagus entered a bronchus.

As one would expect from an anomaly which holds so close to type, the symptoms are typical in all cases. Because the drainage of the oral cavity is limited to one convenient route, from the time the baby is born the mouth seems filled with an exces-

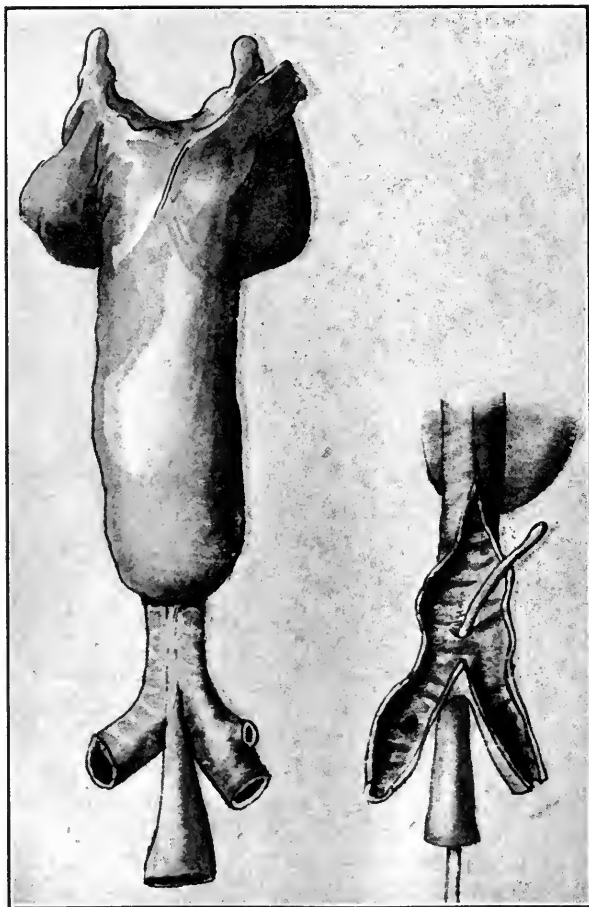


FIG. 1. Diagrammatic figures showing, on left, the upper and dilated portion of the esophagus. The figure on the right shows the opened trachea with a probe in the esophageal-tracheal opening.

sive amount of mucus. This either flows from the most dependent corner of the mouth, or compels attempts at removal by an attendant when it causes choking attacks. The attacks of choking, with or without cyanosis, occur of course when the

mouth is drained by the inconvenient routes, that is, by way of trachea or nose. When the infant is nursed these symptoms are exaggerated. The nipple is taken greedily enough, but after a mouthful or so of milk has been taken the oral cavity is "running over," milk is leaving between the lips, bubbling out of the nostrils, and getting into the larynx, as shown by choking, coughing and cyanosis. At this point the child is usually instinctively "grabbed and turned upside down to empty it."

If not helped in some manner it becomes motionless and limp, but by no means invariably succumbs to what might appear as an inevitable death from drowning, but after a period of almost lifeless relaxation, recovers, is ready to suck, and will repeat the performance if given an opportunity. It is certainly most reasonable to believe that the trachea is more or less effectually drained by the lower portion of the esophagus at such a time. The fact that many of these infants live a week and longer seems also to point that way. The tracheal opening of our specimen at any rate would make such action seem possible. At any rate death from suffocation is rare.

In all of his cases Brennemann observed that the stomach was distended with air, the rest of the abdomen being flattened, and points out the importance of this sign from a diagnostic standpoint, for it "establishes the fact that the stomach and trachea are connected." The air distended stomach is well shown in the roentgenograph of our case.

An attempt to pass a catheter down the esophagus in these infants reveals an obstruction at about 12 centimeters, whereas in new borns the normal distance from the lips to the cardiac end of the stomach is stated as 17 centimeters. I will refer to this again. The temperature is usually raised by the advent of inanition fever after the baby is 2 or 3 days old, and may again be influenced when bronchopneumonia sets in. Lacking some such modifying factor, a normal temperature prevails, dropping to subnormal as death approaches.

The stools are composed entirely of meconium at first, later they are bile-stained mucus. A milk stool in these infants is not to be expected of course, but it would be a matter of interest to know if milk in recognizable quantities is ever drained into the stomach from the trachea. In this connection it is tempting to hint that a harmless, insoluble, and easily recognizable sub-

stance like finely powdered charcoal, introduced per oram during life, might go far to prove conclusively the integrity of tracheal drainage by the lower segment of the esophagus. Were charcoal found in the stomach postmortem this point would be set at rest. Brennemann's view is that most of these infants die of starvation rather than from aspiration pneumonia, or choking,

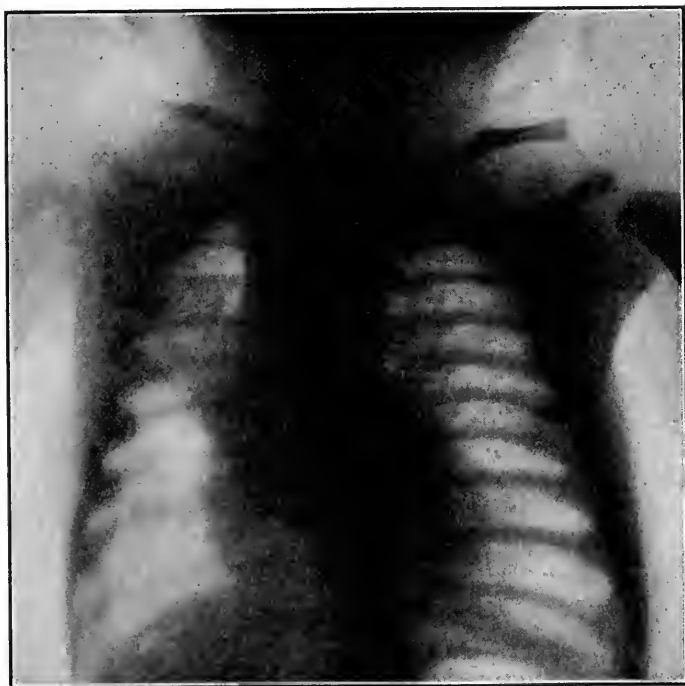


FIG. 2. X-ray of chest showing the blind upper portion of the esophagus filled with a milk and barium mixture. The upper portion of the air-filled stomach can also be seen.

even though a bronchopneumonia is often found postmortem. He points out that bronchopneumonia is usually found in marasmus any way, and that death by suffocation did not occur in any of his last series of cases.

Unless the inevitable end is hastened by persistent attempts at feeding per oram, or by some surgical interference, the infant rapidly passes on to the clinical picture of acute inanition and, in so many words, starves to death. None of these children live more than 2 weeks, their average span of life being about 7 days.

What is to be done for these poor unfortunates? To put it briefly and brutally—nothing. The most that can be done is to make an early, correct diagnosis, stop all attempts at feeding, and spare both infant and parents all unnecessary suffering.

Attempts at feeding per oram will certainly be futile and will only hasten the advent of aspiration pneumonia, or cause death by drowning, or suffocation. Oral feeding is justifiable only for diagnostic or experimental purposes. The limitations in newborns of nutrient enemas offers no encouragement for even a trial. Naturally, in an extremity like this, one turns to the surgeon. Any surgical procedure designed to give an opportunity for life in tolerable comfort must fulfill the following conditions: 1. Allow oral feeding. 2. Obviate continual danger of aspiration pneumonia. 3. Secure freedom from infection induced by accumulations in the blind upper portion, or at the point of ligation of the tracheal portion of the esophagus. 5. A technique that would insure a reasonably low mortality.

The only conceivable way to meet all these conditions would be to unite the upper with the lower portion of the esophagus. Such a formidable undertaking under the present limitations of intrathoracic surgery, coupled with such a poor surgical risk as a newborn, can hardly be considered seriously.

A simple gastrotomy has often been performed on these infants. It always had the same result. The lungs are flooded through the esophagotracheal openings as soon as fluid is put in the stomach. Relief by this method would certainly not be attempted by any one with the anatomy of this anomaly in mind.

Jejunostomy, as suggested by Demoulin, has also failed although it tends to save the lung from flooding; it cuts off the digestive functions of stomach and duodenum and imposes greater surgical and feeding difficulties.

Gastrotomy combined with ligation of the lower portion of the esophagus has been performed by H. M. Richter⁵ and has allowed the introduction of food into the stomach without pulmonary flooding. If an infant could be made to survive an operation like this the even more dangerous anastomosis of the esophagus would still be logically expected to follow. So when we consider the peculiar anatomical conformation of the anomaly, the unfavorable field for successful surgery that the delicate economy of the newborn offers plus the limitations of intrathoracic surgery,

these cases may be called hopeless from the beginning. As a matter of fact none have ever survived.

Case Report. On February 2, 1919, I was called by Dr. P. M. Currer to see a male child he had delivered 4 days previously and in which he suspected an esophageal occlusion. It was the third child by healthy parents. Their first was premature and died on the 20th day, their second is a healthy girl of 10 years. This, their last, born normally at term, was large and well developed. Cyanosis was present at birth and some difficulty was experienced in making the child breathe properly on account of the large amount of mucus in the mouth. It was soon evident that the infant did not swallow in a normal manner and though willing to take the nipple, the milk came out of the mouth and nose almost as soon as it entered and an alarming fit of choking coincidentally occurred.

There was nothing of moment or interest in the physical examination otherwise and the symptoms present differed in no way from those already outlined. However, when it came to passing a catheter down the esophagus only a small and very flexible No. 17 F. soft rubber catheter was at hand and that apparently passed down to such a length that it seemed it were either in the stomach or in a diverticulum of some sort. Furthermore considerable mucus syphoned out of the catheter and a distinct clicking noise was heard coming from it, such as is ordinarily elicited when a catheter enters the stomach.

All this was misleading of course and it sounds a warning against a small flexible catheter, which may double and kink, for such explorations. The "hollow viscus click" also proves itself an untrustworthy sign. On the day following the x-ray, after a few teaspoonfuls of milk and barium mixture were administered per oram, revealed the true condition both by fluoroscope and plate. The upper blind portion of the esophagus and the air filled stomach were well shown.

No attempts at feeding were made, but Dr. Currer had a few small doses of paregoric given by rectum. The infant urinated several times and had the usual mucus and meconium stools. The little body practically shriveled up and death came on the 8th day. Dr. Currer performed the partial postmortem allowed

and removed the specimen described. No other anomaly was found.

120 Wisconsin Street.

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OPEN AIR CLASSES (Jour. A. M. A., Oct. 4, 1919). Leopold Marcus describes the work of the Bureau of Child Hygiene of the New York Department of Health and especially the establishment of open air classes in the public schools. They were organized to provide special opportunities for the physically subnormal children after an experimental open air class had been tried. There are now 110 of these at present located on the roofs of the school buildings, in public parks, etc. Experience has proved that in a large city these classes are best placed in the school building. The roofs require the climbing of too many stairs. The public parks would be an ideal location but for the expense of the buildings required. When the school house is originally constructed little additional cost would be incurred for accommodation of one or more open air classes. The following types of children are admitted: those who have had tuberculosis or been exposed to it; those suffering from malnutrition; children who show little stamina and become tired easily and are unable to carry on their class work; children suffering from nervous diseases except chorea; those subject to colds, bronchitis, etc., and heart disease cases when recommended by a physician. The important factors in the success of the work are fresh cool air, light food, correction of physical defects retarding growth and proper hygienic living conditions. These are all provided for during the school session. It has been found that no temperature is too low provided the children are properly protected, and the increase in weight occurs during the colder months. Extra feeding is always provided between meals if possible, and frequent short recesses for recreation are given.—*Journal A. M. A.*

A CASE OF BACTERIEMIA TREATED BY REPEATED TRANSFUSIONS*

By JESSE F. SAMMIS, M.D.
New York.

J. G., age 2½ years, only child, full term, normal delivery, no miscarriages, no history of tuberculosis, father and mother well. Up to present time of illness she has been under my observation at the milk station, Vanderbilt Clinic. Breast fed 11 months, did well. Weight at 1 year, 22½ pounds. Has had no acute illness previous to the present except influenza 1 year ago from which she recovered promptly. One week before admission, child was said to be feverish and 5 days before admission complained of pain in the ear, and an examination disclosed acute otitis media of the left ear, which was incised and a purulent fluid obtained.

The examination at that time showed a well nourished girl baby who was acutely ill, left ear discharging, right ear congested, acute nasopharyngitis, tonsils large, swollen, red, and showing many yellow spots, tonsillar glands enlarged, heart normal, lungs scattered râles, abdomen negative, spleen not felt, temperature 104°. The fever continued to range between 100-104° until day of admission to the New York Nursery and Child's Hospital.

The examination on admission was practically the same as that previously recorded, the child appearing very sick. Cultures from the throat showed streptococcus hemolyticus. A blood culture was taken and showed many colonies of the same organism. The urine showed albumin, with hyalin and granular casts; the blood count 23,000 leukocytes, with 76 per cent. polymorphonuclears. Two days later the spleen became palpable and there were many petechial spots around the ankles and on the abdomen. The child's general condition was considerably worse, the temperature ranging as high as 106° with wide remissions, the child having a general convulsion. A day later the right elbow became red and hot and swollen and subsequently was incised and pus obtained which also showed streptococcus hemolyticus. At this time, on December 31, the 10th day of her illness, the child was given 150 c.c. of mother's blood, the citrate method

* Read before the Section on Pediatrics, New York Academy of Medicine, January 8, 1920.

From the Pediatric Service, New York Nursery and Child's Hospital and the Department of Pediatrics, Cornell Medical College.

being used. She was given 300 c.c. on the 3rd day, the mother being the donor, another transfusion of 125 c.c. on the 20th day, another on the 32nd day. Blood cultures, taken on the 13th day, showed only 5 colonies after 48 hours. Ten days later the same number, and 3 colonies on the 32nd day, the blood culture being negative for the first time on the 48th day. A vaccine made from the child's organisms was given to the mother, the donor, at intervals of 2 days for 4 doses, the number given being 500,000,000 for each dose. On February 3, the agglutination of the mother's serum against the streptococcus isolated from the patient's blood failed to show any clumping in any dilution of 1 to 5 or in 1 to 100. In addition to the usual treatment for discharging ears, the throat was sprayed with a polyvalent streptococcus serum twice a day, and the child was placed on a high caloric diet. After the transfusions the child had 2 reactionary chills and was invariably listless and very thirsty, and within 12 hours the temperature usually reached a higher level than just before the transfusion, but gradually declined to a lower level within 12 hours. The temperature reached normal on the 40th day and has not been above 100° since then. The pus elbow has completely healed although there is a slight loss of function, the ears are not discharging and the appearance of the drum is normal. The tonsils, while still large, look otherwise normal except for rather large crypts.

The child's appetite is excellent and she has gained 2 pounds in the last 10 days, her spleen is just palpable, but much smaller than previously. There are no heart murmurs, the urine is normal, there is slight abdominal distension and constipation.

We feel that the repeated transfusions, 4 in number, were the determining factor in her recovery. When the temperature in the early part of her illness was running very high and the child losing ground, the advisability of removing the tonsils, as being the undoubted original focus, was discussed and our intention was to remove them, if the course continued to grow more severe. Inasmuch as the child showed slight continuous improvement following the transfusion this was not done.

The number of the colonies in the first culture were so numerous that they could not be counted. The second blood culture taken after 1 transfusion and previous to giving any vaccine to the donor showed a remarkable reduction in the number of colonies,

only 5 colonies to 1 c.c. of blood. The improvement was as marked following the first 2 transfusions as following the latter 2, which were given after the donor had been given the vaccine.

Inasmuch as the mother's serum did not agglutinate the child's organisms, we believe that the actual blood was the factor rather than any immunity conveyed in the mother's blood.

ACIDOSIS OF THE RECURRENT VOMITING TYPE (Boston Medical and Surgical Journal, August 19, 1920). W. W. McKibben reports in detail the case of a child 20 months old, whose history is illustrative of the type of acidosis known as recurrent, cyclic or periodic vomiting. Babies and children of neurotic ancestry, he says, and of lithemic diathesis, tend to periodic attacks of vomiting. This is due to disordered fat and carbohydrate metabolism, as well as to sensitization to certain definite food proteins to be found out by skin reactions, or even more important, by experimentation with the foods themselves. The best way to meet the attacks is by stopping everything by mouth and giving one or two cleansing irrigations daily of sodium bicarbonate; and glucose or dextrose in solution by rectum; for the interval, elimination from the diet of all proteins to which the baby is sensitive until the baby desensitizes itself, or is desensitized; also a low fat and sugar intake. It is essential when nearing the cycle, or when the slightest symptoms recur, to watch, or better still, to have the urine closely watched by a physiochemist, so that at the first warning, a sufficient quantity of sodium bicarbonate may be given to neutralize the urine or to render it alkaline. It is important that these precocious children have long hours of sleep, and play alone out of doors as much as possible.—*Medical Record*.

THE ORGANIZATION OF A MODERN PEDIATRIC SERVICE

HENRY HEIMAN, M.D.,
New York.

In recent years pediatrics has received a remarkable stimulus for development. The war has emphasized most urgently the need for the protection, conservation and efficient medical care of the infant and child. The pediatrician of today must be cognizant of this ever widening sphere of activity. He must view the subjects of child hygiene, routine physical examinations for remedial defects, the problems of nutrition, of the child mind, and public measures for child welfare with as keen an interest as the diagnosis and treatment of disease.

One of the most potent factors for the realization of modern ideals in pediatrics is the organization of hospital services on a newer and broader plane. Various phases of this subject have been dwelt upon by several workers, notably Charles Hendee Smith and Frank Howard Richardson. It is our purpose to outline a plan for the organization of a model pediatric service in a large modern hospital.

Such a service should include the infants' and children's wards and the out-patient department. The latter has long been a neglected and disorganized part of most of our institutions. The overcrowding of patients and the irregular attendance of the staff, often inexperienced and without definite direction, have produced a very inferior type of pediatric work. We must realize that dispensary cases present problems for diagnosis and therapy as difficult and complex as those admitted to the wards. They require the same careful analysis, the complete examination and study as that given by the trained pediatrician at the bed-side. They present moreover, greater opportunities for the diffusion of social and educational work in child hygiene and preventive pediatrics. To accomplish the best results, the dispensary must be made an integral part of the pediatric service under one leadership. This means greater efficiency in the "follow-up" system of cases discharged from the wards; it means opportunity for the physicians working in the out-patient department to study intimately cases which they refer for hospital care.

To man such a complete service we might suggest the following functionaries: a pediatricist to the hospital, 1 associate, 4

adjuncts, 16 senior assistants, 16 junior assistants, and an indefinite number of clinical assistants.

The pediatricist to the hospital should primarily direct the work of the entire service. He should be a man of broad clinical experience, ready to employ any new scientific methods for diagnosis or treatment emanating from the modern laboratory. He should not only co-operate with his subordinates but inspire a spirit of co-operation throughout the service.

The most important function of the pediatricist to the hospital is the making of his daily rounds. They should begin at a definite hour each morning. He should be accompanied by 2 adjuncts and as many others of the staff as possible. Twice a week the whole staff should be expected to attend the so-called "grand rounds," a longer period devoted to the presentation and discussion of all the cases. Any unusual developments of the week are reviewed. These rounds should include a visit to the out-patient department where are seen those cases of unusual interest referred for consultation by the adjunct in charge.

Special subjects for preparation outside, and appropriate material for study in the hospital, may be assigned by the chief to various staff men on these occasions. Twice a month service conferences should be held at which topics of interest are presented.

The pediatricist to the hospital should supervise the hygienic care and feeding of infants and children on the surgical service. He should be called upon to treat medical complications arising in surgical cases. It shall be his function to outline a course of instruction in pediatrics for nurses, to assign lecturers and provide for suitable demonstrations.

The associate should at all times know intimately the details of the service and be ready to act as pediatricist to the hospital in the absence of the latter. It should be his duty to visit the wards each afternoon to see and treat all acutely ill cases as well as new cases admitted during the same day. His rounds should end at the out-patient department where he should act in the capacity of daily consultant.

The supervision of the diet kitchen, the instruction of nurses in the preparation of infant formulas and the arrangement of the dietaries of older children are important functions which could be intrusted to the associate.

There should be 4 adjuncts on continuous service, but alternating as to their duties. Two of these should work in the wards; the others to be in direct charge of the out-patient department. The adjuncts on ward duty are expected to make rounds each morning with the attending. They should be familiar with, and ready at all times to demonstrate the details of all laboratory procedures ordered for patients on the pediatric service. They are to be the connecting link between the services and the various important laboratories of the hospital—the clinical, pathological, electrocardiographic, and x-ray. If they have not already had training in these departments such instruction should be instituted. It should be their function to study special problems in the light of clinical and laboratory experience.

In the absence of the associate from duty one of the ward adjuncts shall act in such capacity. The responsibility for the supervision of the history charts and their prompt filing on the discharge of patients may be assumed by one of the ward adjuncts.

We recommend the appointment of a resident pediatricist. The prescribed course for internes necessitating frequent changes in the house staff does not work for the best interest of the pediatric service.

In the out-patient department there should be 2 clinics, each in charge of one adjunct. These clinics should be held on alternate afternoons. We do not favor routine morning and afternoon clinics. Under proper guidance and efficient organization, we believe that the afternoon clinics can care for all the out-patient applicants. Such an arrangement will give the physicians in the out-patient department an opportunity to make rounds with the chief of the service and add much to the interest of their work. The acutely ill cases that sometimes come to the morning classes should be directed to the hospital admitting department.

During the morning hours the dispensary rooms could be profitably employed for the study and treatment of special segregated groups of cases, pertussis, vulvovaginitis, and for consultation cases for the chief of service on "grand rounds."

The clinics, each under direct supervision of an adjunct may be divided into 8 classes according to disease:

1. Infant Feeding
2. Nutrition
3. Cardiac
4. Preventive Pediatrics
5. Protein Sensitization
6. General Pediatrics
7. Pertussis
8. Vulvovaginitis

Each group shall be in charge of one senior assistant, who shall direct his efforts to the study of the special problems of his class. A case of unusual interest, however, could be seen by all the men. A rotating service would insure a thorough and comprehensive training in all branches of pediatrics.

A junior assistant, and as many clinical assistants as required, should be appointed for each class and should rotate with their respective senior assistants.

In connection with the infant feeding class we recommend the establishment of a thoroughly equipped milk station. Here instruction to mothers in the preparation of formulas should be given and the various sugars and cereals required sold at cost to deserving applicants.

For the nutrition class, posters, diet sheets, food exhibits with special demonstrations, individual instruction, and competition for prizes may be employed to advantage.

Cardiac classes are now well organized in a number of our large institutions. Provision should be made for the more extended application of functional tests and graduated exercises to increase functional efficiency. A closer association with the school system should be encouraged.

Preventive pediatrics is one of the most important recent developments. The routine examination of children of pre-school age for the correction of remedial defects is of tremendous value in our endeavors for the health of our future manhood.

Classes in protein sensitization should include those cases in which the disease is related to some specific protein, generally determined only by careful study and the use of special tests. This group would include cases of bronchial asthma, hay fever, urticaria, and eczema.

The general pediatric class provides for all cases not treated in the special groups.

The pertussis and vulvovaginitis classes should be held on alternate mornings. The adjunct of each clinic might designate 2 senior assistants to take charge of this work.

An adequate number of well-trained nurses is essential for

the efficient management of the service. A minimum of 1 nurse for 5 patients during the day and 2 nurses for each ward at night should be provided.

We strongly recommend the training of nursery maids; the latter, by attending to the more menial and less skilled work, would lessen the burden of the nursing staff.

Too much stress can not be placed upon the importance of the social service worker. The environment of the home, the mental outlook of the parents, the special aptitudes of the patient are becoming of ever increasing significance. Such details can be gleaned only by the social service visitor. Instruction in child hygiene, the preparation of infant formulas and dietetics, when offered by a sympathetic worker in the home, is an invaluable aid in our health program. Arrangements for the care of patients in convalescent homes or in special institutions may be delegated to the social service department.

The volunteer worker who came into being during the stress of war has proved her usefulness. Efforts should be made to enlist more women for this cause. They are especially adapted for out-patient work, where only 2 hours every day or every other day are required. History taking, weighing of children, food demonstrations, individual talks are functions in which they soon become very proficient.

Complete recording of histories, with tentative and final diagnosis for the ward as well as the out-patient cases, is essential to every well organized service. There should be a complete nomenclature of diseases. All histories of the ward and the out-patient department cases should be double indexed according to the name of the patient and of the disease.

We have outlined some of the important elements in the organization of a model pediatric service. To realize fully its possibilities there must be engendered a spirit of cooperation and the development of a genuine esprit de corps.

64 West 85th Street.

SOCIETY REPORT

THE NEW YORK ACADEMY OF MEDICINE. SECTION ON PEDIATRICS.

Stated Meeting, Held October 8, 1920.

CHARLES HENDEE SMITH, M.D., *in the Chair.*

THE PSYCHOLOGY OF THE CARDIAC AND THE DOCTOR.

DR. ROBERT HURTIN HALSEY presented this communication, in which he stated that children with heart disease had varying degrees of specific deviation from the normal, and frequently certain general, acquired, mental, social, educational and environmental differences. They frequently showed a lack of initiative, a disinclination to associate with others; often a moderate grade of school knowledge, and a certain eager readiness to attribute their backwardness and inefficiency to heart disease. It seemed that these general deviations were derived from 3 sources, namely, the family, friends, and teachers; others with heart disease, and the family physician. There was a popular tradition that "heart disease" connoted the possibility of sudden death. Unfortunately popular tradition made and knew no distinction in degrees or forms of the disease. The doctor frequently was responsible for unnecessary medicine and undue restrictions because the patient was not thoroughly studied, and his limitations determined, but rather all cardiacs were treated as hopeless cases with the expectation of imminent early death. Since primarily the physician must instruct family, teachers, and the cardiac, it seemed to the writer that the means of modifying these various mental influences, which increased the introspection of the cardiac, increased his hopelessness and retarded his physical and mental development. The child could and would adjust itself to restrictions if it had some substitute method of occupying its physical energies as well as satisfying its mental desires. The cardiac child reacted to environment and was stimulated by group work to rapid development, mentally and physically. A wholesome mental atmosphere was created by encouraging active, useful recreation work and the pursuit of some vocational training suitable to the creed, race and social status of the child. The physi-

cian could obtain better results and perform a greater service by a more careful study of the individual cardiac and the social problems involved. Physical exercise properly directed in games, dancing, and occupations would help to improve the cardiac muscle and the mental attitude or temperament of the child. Gathering cardiac children in groups did not produce hypochondriac depression, but rather stimulated a rational cheerfulness. The individuals learned to discriminate and differentiate between the severity of their conditions. The individual improvements were noted, and the whole group derived encouragement. When there was better understanding of the restrictions, there was better co-operation, and better co-operation meant better results in a longer and productive life.

SYPHILIS IN CHILDREN OF SCHOOL AGE WITH HEART DISEASE.

DR. BLAKE F. DONALDSON presented this paper by invitation. He stated that during the last school year, 28,000 children were on the register in a district of 17 schools, located in New York's lower East Side, assigned to the cardiac clinic of the Post Graduate Hospital. All the new children in these schools, together with such of the other children who were suspected of having diseases of any kind, were examined by school medical inspectors of the Department of Health. Seven hundred children were thought worthy of note because of some cardiac abnormality. These selected cases were then passed upon by Dr. Robert Halsey and a staff of assistants. Of these cases, 167 were found to have organic heart disease—forceful sounds, reduplications, high pulse rates, and accidental murmurs accounting for the rest. The Department of Health of New York City reports that the incidence of heart disease among school children, as noted by its medical inspection in 1918 was 1.6 per cent. In their group of 167 organic cases, there were 13 cases of organic insufficiency, and 5 of pulmonic insufficiency, in combination with either mitral stenosis or mitral insufficiency. Of these children, 84 were selected for medical observation in a special class connected with Public School No. 64. The work was in the nature of an experiment to determine the wisdom of segregating school children with heart disease. The comparatively large number of aortic cases (8 per cent.) in their series was rather a surprise. In the aortic cases

the diastolic murmurs were best made out with the patients in the erect position after forced expiration. One hundred and three Wassermann reactions were made on the 84 children registered and on the mothers and any other available relatives of the children with aortic insufficiency. A positive Wassermann was obtained in only 1 child. This was a well compensated case of aortic insufficiency with a history of frequent attacks of tonsillitis and 1 severe attack of acute rheumatic fever. The mother's reaction was 4 plus. Neither the mother nor the child showed any other evidence of syphilis. One case of potential heart disease was of special interest. This was a child with a marked anemia of the pernicious type, with a high color index and many nucleated red cells, a marked enlargement of the spleen and liver and slight generalized icterus. Out of a family of 11 people, 8 members were affected in almost the same manner. They all had the primary type of anemia with splenic enlargement. The aortic cases noted all had definite histories of acute rheumatic fever, save 1 who had only diphtheria. In children one expected to find aortic disease as the consequence of rheumatism, syphilis, or some extraordinary strain. Of late years, perhaps because of improved diagnostic methods, syphilis as a causative factor, especially in children, had been over-emphasized. Abbott stated that by far the chief cause of aortic disease in persons under middle age was rheumatic fever. Statistics were quoted from a report of Poynton, Aggazzis and Taylor on 250 autopsies on children who died of rheumatism showing the different types of cardiac involvement found. It might be concluded from this limited number of cases that syphilis was not a very great factor in the causation of heart disease in children.

CIRCULATORY REACTIONS TO TEST EXERCISES IN CHILDREN WITH
HEART DISEASE.

DR. MAY G. WILSON read this paper, a preliminary report which had for its objects: (1) To increase the number of observations of a previous study on the circulatory reactions after test exercises in normal children; (2) To compare the circulatory reactions after test exercise in the cardiac group with those obtained in the normal group; and (3) To study the exercise tolerance of children with heart disease to standard test exercises.

These investigations were conducted upon a group of average

normal girls 10 to 15 years of age, and upon a group of 65 children with cardiac disturbances, including all manifestations of organic heart lesions, congenital and acquired, as well as possible and potential heart disease.

The test exercises utilized were: (1) swinging 1 or 2 iron dumb-bells (2, 3, 4, 5, 7, and 10 lbs. each); (2) stair-climbing tests, 2 and 4 flights (20 to 60 steps) a rise of 15 and 30 feet taken in 20 to 30 seconds; (3) jumping rope 100 times in 100 seconds; (4) setting-up exercises, 30 minute drill daily for 6 weeks.

The circulatory reactions, following these test exercises in the group of normal girls, and in the cardiac group, confirmed the results obtained in the earlier investigation. The circulatory reactions following the stair-case test and the rope-jumping test were similar to those obtained in the dumb-bell test.

A working table was formulated of standard test exercises followed by normal systolic blood pressure curves, without symptoms of dyspnea and fatigue. It was standardized from an analysis of reactions of an average group of 35 normal children, according to age, weight and height.

The degree of distress and type of systolic blood pressure curve following standard test exercises was used as a gauge in estimating the exercise tolerance of children with heart disease.

Of the 40 children having definite organic heart disease, without symptoms of insufficiency, approximately two-thirds had a normal tolerance for standard test exercises, and one-third had a fair tolerance. An analysis of the case histories of the cardiac group showed that in 90 per cent. the children were excused from school exercises; in 75 per cent. free play had been interdicted by either physician or parent, but nevertheless 61 per cent. admitted ability to tolerate stairs and games equally well with playmates. Five illustrative cases were cited.

THE PLACE OF TONSILLECTOMY IN THE MANAGEMENT OF CARDIAC DISEASE IN CHILDREN.

DR. WILLIAM P. ST. LAWRENCE made this contribution, which consisted in an analysis of a series of 85 children, each of whom had present 1 or several of the rheumatic manifestations before the tonsils were completely removed and all of whom were observed during an average period of $3\frac{1}{2}$ years after the operation

was performed. The tonsils were markedly hypertrophied in 13 per cent. of the cases, and not enlarged in 18 per cent. of the cases. They were the site of recurrent inflammation before the tonsils were removed in 73 per cent. of the cases. "Sore throat" recurred after removal of the tonsils in 7 per cent. of these. At least 2 operations were necessary before the tonsils were completely removed in at least 22 per cent. of the cases. The tonsillar lymph nodes were enlarged in 100 per cent. of the cases before the operation was performed, while in 59 per cent. of the cases they were impalpable afterwards. One or more attacks of acute rheumatic fever had occurred in 42 cases before the tonsils were removed. After tonsillectomy there were no more recurrences in 35 cases, or 84 per cent. One or more attacks of chorea had occurred before the removal of the tonsils in 40 cases, and there were no recurrences of the chorea in 20 of these cases, or 50 per cent. Sixty-one cases showed myositis and bone or joint pains before operation was performed, and there was no recurrence in 47 cases, or 77 per cent. Fifty-eight cases of organic disease of the heart were present in the series. Twelve of these patients had suffered at least 1 attack of cardiac failure before the tonsils were removed. One patient suffered 1 attack afterward. The exercise tolerance seemed to be favorably influenced by tonsillectomy in the cases of cardiac disease in the instances in which indications existed for the removal of the tonsils. Nutrition and general health were improved, and intercurrent disease was less frequent after the tonsils were removed. Tonsillectomy (complete removal of the tonsils) would seem to be the most important measure at present available for the prevention of acute rheumatic fever and the allied rheumatic manifestations.

Discussion—DR. THEODORE B. BARRINGER, JR., said he thought Dr. Wilson had presented a very important piece of work because it furnished the groundwork for the intelligent treatment of heart disease in children by exercise. Of course it might be assumed with much reason that children would respond to exercise treatment in the same way that adults did, yet the actual proof had been lacking until now. The speaker stated that he had been watching Dr. Wilson's work on a number of occasions and was impressed by the careful and conscientious technique she used. As regards her results, it was quite interesting to see how rapidly the pulse

returned to normal, almost invariably inside of 2 minutes. This return to normal was of no value in children as a criterion of their exercise tolerance and really of but little value in adults. The effects of exercise upon the blood pressure curve showed the same types as in adults. The term exercise tolerance Dr. Wilson used very frequently. He felt that we should be very clear in our minds as to the significance of that term. The term exercise tolerance simply put before us the conception that the best way of judging of a heart's capacity was by the way the person tolerated exercise. That was a valid conception because the best way of ascertaining any organ's capability was by setting it doing its own particular work, and basing our judgment on the result of such experiments. Whether a person tolerated exercise depended essentially upon the heart's reserve power, assuming that the lungs and muscles were functioning in a normal way. Dr. Wilson qualified the term by specifying the amount and kind of exercise and that was a very necessary qualification, because the term exercise tolerance might mean very different things. One person might tolerate walking on the level very easily, but would be distinctly overtaxed by climbing stairs. One point brought out was that 90 per cent. of cardiac children did not take exercise in the public schools because it was interdicted. That was a striking commentary on the way these children were being treated. Exercise undoubtedly increased the resistance to general infections in those children exactly as it did in normal children, and also in all probability increased the resistance of the heart itself to reinfections. Dr. Wilson had made a very valuable contribution because she had provided a sound experimental and physiological basis for the treatment of heart disease in childhood by physical exercise.

DR. L. E. LA FÉTRA said the important lesson to be drawn from the papers was that as physicians we should foster a more cheerful sentiment among the laity with regard to heart disease; we should exercise the varicose vein of gloom.

DR. HENRY HEIMAN said he wished to say a word on Dr. Halsey's paper. It was extremely difficult to tell what the future was going to show when a child had his first and primary attack of heart disease, whether this was going to recur or not. He believed we were not in a position to say whether there would be a recurrence. One met with instances in which there was 1

attack and not another, while others had regular attacks perhaps 5 or 6 times until an attack terminated fatally.

In regard to Dr. Donaldson's paper, Dr. Heiman said he agreed with him that in every aortic cardiac case the Wassermann test should be made, but in very few would a positive Wassermann be found. He also agreed with Dr. Barringer that Dr. Wilson had given them a very valuable contribution. She had given a test for the physiological heart and for the pathological heart, so that one could test practically and accurately what a patient could do. It recalled Gertel's work in mountain climbing for adults with heart disease.

As to Dr. St. Lawrence's view of tonsillectomies, he stated that a great many men gave merely opinions on the subject. What we need is broader clinical observation. When a patient was brought to us to determine whether the tonsils should be removed or not, he thought all were agreed that there must be definite indications for removal. These indications were (1) hypertrophy with marked obstruction. (2) infection. (3) repeated attacks of tonsillitis. (4) enlarged adjacent lymphotus. Of course when the tonsils were removed the child no longer had repeated attacks of tonsillitis but there might be manifestations of systemic infection. Many of these children previously diagnosed as having tonsillitis, after the tonsils were removed may develop a pharyngitis, a faucitis or an adenitis, lasting 3 or 4 days. This is often diagnosed as a cold, or if there are symptoms referred to the stomach, as stomach trouble. He believed the systemic disease that would have caused tonsillitis if the tonsils were not removed was present and frequently manifested itself in other ways. It would be interesting to know whether diphtheria develops, since this is an organism with a predilection for the tonsils. after tonsillectomy. One word of warning in connection with the subject of tonsillectomies might be in place. One should never promise that a tonsillectomy would prevent a cold, and it should be recommended only in cases in which it was definitely indicated.

DR. HERBERT B. WILCOX said it should be gratifying to every one interested in the handling of sick children to hear Dr. Halsey emphasize the importance of the mental reaction of these young patients to the limitations which their infirmity places upon them.

and its possible exaggeration by the attitude of the parent, friends, and particularly the physician, who alone often initiates this attitude, or is in the best position to control it. Whether this disability be due to cardiac or other systemic disturbance, there is no more important element in determining the degree of effect which the lesion is to produce on the child's life, than the failure or success of those in control to produce in this child a proper attitude toward his physical condition. This important factor has been largely neglected; it is probably true that the majority of us have thought more of the physical effect of exercise than the mental effect.

In regard to the role of the tonsils as a portal of entry, and a seat of elaboration of toxins, Dr. St. Lawrence's experience and belief must be those of all of us.

Children who have asthma, those who suffer from chronic digestive disturbance with periodic exacerbations resulting in all the evidences of acute gastrointestinal disturbance with toxemia; those who present repeated attacks of vomiting without apparent cause; each of such type seems to divide itself etiologically into 2 groups, the one depending upon continued absorption of the products of bacterial activity from a known or unknown source, the other depending upon the constant absorption of toxic material due to disturbance of the chemistry of digestion. These 2 causative factors are about equal in importance, and of the former the tonsil is at fault in the majority of cases.

Re-growth of the tonsil may occur more or less frequently according to age, and of course according to the completeness of its enucleation, and if recurring may cause a repetition of the former poisoning.

There can be no doubt that the lingual tonsil is quite as important as the faucial tonsils in causing cough as a result of mechanical irritation of the throat, and in increasing susceptibility of the upper respiratory tract to infection. How much the lingual tonsil is responsible for symptoms due to absorption is less certain. It should however be considered in each case, and if the growth of lymphoid tissue at this site is abnormal, it should be as carefully removed as the contents of the tonsillar fossa.

DR. LOUIS FAUGERES BISHOP said he thought the section was to be congratulated on the meeting. He liked the idea of taking the gloom out of heart disease. There was nothing greater which

came to the man dealing with heart disease than the satisfaction derived from the restoration of confidence. It was a great satisfaction to see the psychological effect on the family of the child who had heart disease when they learned that the child could do many things that other children did. He had seen these children with cardiac disease, who were practically invalids, after they had learned that they could exercise come back at the end of a year looking cheerful and bright, doing everything within reason, and in every way different beings all because somebody used the experimental method and the child was allowed to do anything it could without objective or subjective discomfort. There was no rule as to the amount of exercise that should be permitted. He thought the old fashioned method of putting children to bed for prolonged periods of time was very foolish. When the period of infection had passed, there was certainly no reason for keeping the child in bed. After a certain time the hypertrophy was no greater if the child was allowed to be about than if it was kept quiet. There was another very important point in the prognosis and that was with reference to the effect of diet. These children, especially those with aortic involvement, had a strong tendency to develop kidney complications, and kidney complications were much less likely to happen if the child was kept on a lacto-vegetarian diet. A fatal termination in some of the worst cases was indefinitely postponed by strict attention to diet. Also the question of resistance needed emphasis. He felt sure these children were much less apt to have infections if they were kept in good health. If they were kept in bed their resistance was lowered and they were much more likely to have infections than if allowed to be about and play.

However, this doctrine of experimental determination of the limits of exercise must be applied also to those with failing compensation and those who do not respond must be duly restricted. We have given the exercise pendulum such a push that it is sure to go too far in unskillful hands.

DR. ROGER H. DENNETT said he understood Dr. St. Lawrence to advise the removal of the tonsils in 80 per cent. of the children with cardiac disease. He did not see why Dr. St. Lawrence did not say 100 per cent. of cardiac cases, in a child with good compensation. It was perfectly obvious that we did not know what was at the bottom of a tonsil by looking at the outside. If there

was any opportunity for preventing the return of cardiac symptoms by removing the tonsils, why not take out the tonsils in every case?

He said that Dr. Wilcox spoke of the many cases of periodical vomiting and cyclic vomiting and that many of these cases were due to the tonsils. He thought that in the list of those conditions in which the tonsils should be removed nephritis should be included, and that the tonsils should be removed in 100 per cent. of nephritis cases. Here was something we could do in a curative way and in a very definite way, so why not do it every time? With reference to Dr. Wilson's tests, he wondered whether she had ever felt that the tests had ever done any harm in giving the severe tests.

DR. WILLIAM ROSENSEN thought the psychological effect on the patient and the patient's parents could not be emphasized too strongly. We should not make a diagnosis of cardiac disease, as often occurred, from simple auscultation of a cardiac murmur. Frequently we saw cases diagnosed as cardiac disease by school physicians and general practitioners simply because a cardiac murmur was present. He had seen several such cases in which there were loud, rough, blowing murmurs transmitted to the left which were observed for some time and had entirely disappeared. The electrocardiograms, however, were normal, the x-ray showed no enlargement, and there was perfectly good function. He had seen also a number of cases, about 10 per cent. in 200 at Mount Sinai Hospital in which aortic insufficiency was associated with mitral disease, and he did not think that aortic disease was as rare as was once believed. In 1 case, in which there was a definite aneurysm, the Wassermann was positive. Dr. Rosenson asked if there were any direful effects from the strain of the tests; if dyspnea, pain and cyanosis were produced. He had seen 2 cases of mitral stenosis without attacks of decompensation, both of which developed definite auricular fibrillation, and went down hill rapidly. These came on after moderately severe exertion.

DR. THEODORE B. BARRINGER, JR., said he was much interested in one question Dr. Rosenson brought up, and that was the result of physical over-exertion in cardiac cases. His experience had been quite negative in that respect. Some years ago he had had 3 cases that showed decompensation, which required 2 or 3 days in bed and the administration of digitalis. Since then he had

seen no such cases of decompensation due to over-exertion. A paper was about to be published based on 1,000 cases of heart disease treated by physical exercise out of doors in which the author had seen only 2 or 3 instances of trouble following physical exertion and as a rule that cleared up after a day in bed. It was extremely unusual to have decompensation due to over-exertion; he believed it was due to reinfection instead of over-exertion. He would like to ask the last speaker whether he saw these cases at the time the over-exertion occurred or 2 or 3 weeks afterward. As a rule if the attack did not come on within 2 or 3 hours after the over-exertion it was due to reinfection. In angina, recurrences are often the result of over-exertion.

DR. L. E. LA FÉTRA said that although it was a rare occurrence, sudden excessive physical exertion did produce decompensation, and it was important to bear that fact in mind. These cases reported as being subjected to the tests were under the supervision of a physician and in these circumstances there was no danger. There were, however, children who, if they walked rapidly up 2 or 3 flights of stairs, would develop acute dilatation at once from cardiac strain. As an illustration, Dr. La Fétra said he had had a child under his care for valvular disease who was doing quite well. Written instructions had been sent to the boarding school she attended that she was not to walk up more than 1 flight of stairs and that she should stop half way up the stairway for 2 minutes. During a celebration at the school the teacher who had the child under her special charge was called away and the child ran up 2 flights of stairs. She was taken immediately with faintness and there was difficulty in restoring her. She developed an acute dilatation at once, had auricular fibrillation and later had a recrudescence of the cardiac infection, so severe that she died after about 3 weeks.

DR. CHARLES HENDÉE SMITH said he wished to echo Dr. La Fétra's experience. He had seen a young man, an athlete, 2 or 3 years out of college, carry a canoe weighing 75 pounds over a mountain. Following this exertion the apex of the heart moved out of the nipple line, there was a systolic murmur and dilatation of the heart. Dr. Smith said he felt sure that Dr. Wilson and Dr. Barringer did not give the exercise tests to hearts really affected, and he did not believe any damage would result from the test exercises as he had seen them given and had tried them

himself. A child who had decompensation and whose heart muscle was flabby and infected would not be harmed by these exercises.

Dr. Smith said that Dr. Halsey's paper on the psychology in these cases had interested him very much. He had heard much criticism that they were making these cardiac children neurasthenics by putting them in a class by themselves. The organic case was in a class by himself and the sooner he learned what he could do and what he could not do the better for him. He could be made perfectly cheerful, but he must learn his lesson, and the sooner he learned it the better his chance for a long life. A cardiac class was no more gloomy than a nutritional class or a syphilis class or any other class.

About the tonsillectomies, it might be well to recall that tonsils re-grew, and the leucocytes could come and re-infiltrate the same region. He had seen cases in which the tonsils were removed and within $3\frac{1}{2}$ years there was re-growth of tonsillar tissue.

At the moment he could recall 2 children in whom the tonsils were entirely removed when the children were 2 years of age. Each of these children now had a beautiful pair of tonsils. Beside the lingual tonsil which remained and could be infected was the postpharyngeal tissue which could also be reinfected just as the tonsil.

DR. HALSEY, in closing the discussion, called attention to one great advantage of physical exercise in cardiac cases—that was the effect it produced on their psychology, making these patients more optimistic. The old mental attitude toward heart disease was still practically the rule, and it was only since exercise had been begun in these cases that the mental attitude toward cardiac cases was changing. He wished the confidence of physicians in physical exercise to become such that they would feel safe in going ahead and prescribing exercises, remembering always that there must be a differentiation between individuals with different conditions of the heart muscle. The danger was that in the great enthusiasm over the application of exercise in the treatment of heart disease, differentiation would not be made and they would have patients doing 20 pounds of work when they should be doing only 2 or 3 pounds, in which case, results such as Dr. La Fétra had just related, would ensue. The lesson was to be very careful until the patient learned the capacity of his own heart muscle. In applying work they had seen a marked improvement in the

mental attitude and that was one of the great helps that exercise afforded. Children who had been shut out from games and exercise, and who spent their time in bed, improved rapidly when they found they were no longer shut out from all activity.

Dr. Halsey cited the case of a girl 8 years old who had an operation for appendicitis and it was found that she had a cardiac murmur. After that discovery she was never allowed to leave her mother. She was not allowed to play ordinary games, was kept out of school and was a source of great anxiety to her family. To find that she could play games and do many things that other children could do was a great relief to the family and a great joy to the child, and that was what exercise did; it improved the psychology as well as the physiology.

Dr. MAY G. WILSON said she appreciated the question raised by the gentlemen as to the danger of any harm resulting from the exercise tests. She had felt the same way about a year ago, and for this reason first investigated the reactions of normal children. As Lewis advised, she proceeded slowly with cardiacs, first giving simple tests that were not at all strenuous, and then gradually working up. She did not wish to leave the impression that cardiacs had been given test exercises which produced distress. The initial test exercise was always much below the tolerance of the child, and gradually increased. Of course it was understood that one did not need to give an exercise tolerance test to a child with cardiac failure; that child belonged in bed.

Dr. WILLIAM P. ST. LAWRENCE said he thought Dr. Dennett was right and he wished he had had the courage to take out the tonsils in 100 per cent. of the cardiac cases. With reference to Dr. La Fétra's case of heart failure following over-exertion, Dr. St. Lawrence said he had had 25 cardiac children who had been exercising for 3 or 4 years and he had never seen any ill effects from exercise within reason and with moderation. It would be interesting to know whether in the case Dr. La Fétra cited there was any other infection, and whether the child had a temperature before the exertion. It was their custom to take the temperature before allowing exercise, and if the child showed an elevation of temperature it was excused from exercise.

Dr. LA FÉTRA replied that the temperature had not been taken before the child went up stairs. On the other hand, the child had been free from temperature and the child was inspected each day.

Emphasis should be placed on the fact that these test exercises were given under the supervision of a physician. The cases of heart failure occurred from over-exertion when the children were not under such supervision. He quite agreed that cases of heart failure from over-exertion were exceedingly rare in children unless there was infection, but they did happen. It was to be understood that his remarks referred to the cardiac child who was allowed to go to school and run up 3 or 4 flights of stairs when there was no physician to regulate his exercise.

DR. WILLIAM P. ST. LAWRENCE, in closing the discussion, said he thought he had said that about 90 to 95 per cent. of cardiac children presented indications for the removal of the tonsils. A few cases presenting no indication other than slightly palpable tonsillar nodes showed no recurrence of the rheumatic manifestations after tonsillectomy. In these cases, however, the exercise tolerance was in general much less favorably influenced than in the cases where definite indications existed. With reference to Dr. La Fétra's case of cardiac failure, Dr. St. Lawrence said that he had been studying the exercise problem in a class of 125 cardiac children during the past 4 or 5 years. In the absence of some other factor, he had never seen harmful results from exercise intelligently administered. He had been impressed with the importance of infection and toxemia in relation to the exercise tolerance in all degrees of cardiac disease but particularly in second and third degree cases. It would be interesting to know if the case Dr. La Fétra cited had any infection and whether the temperature had been taken before the exertion. In the absence of such a determination, he felt that infection could not be ruled out by a physical examination, for he had frequently found temperatures of 99.4° to 100.4° without symptom or sign of acute disease. It was their custom at the cardiac exercise classes to take the temperature at the beginning of each exercise period, and when found to be above normal, exercise was forbidden.

DEPARTMENT OF ABSTRACTS

CAUTLEY, EDMUND: ALVEOLAR SARCOMA WITH METASTASES IN THE SKULL. (*British Journal of Children's Diseases*, July-September, 1919, p. 144.)

Cautley records a case in a child $2\frac{1}{2}$ years of age. When first seen, he looked pale and drowsy, and lay on the right side with the knees drawn up and his hand raised to the left ear. There was slight rigidity of the neck, no ocular signs or fundus changes. Normal knee jerks, slight *tâche cérébral* and right facial palsy. This latter persisted and some 5 weeks later the head showed bilateral temporal bulgings. The head became gradually larger when finally nodules about the size of marbles appeared, especially on the vertex. Some of the lumps were hard, others soft and almost fluctuating. These gradually assumed a greenish tinge. He also developed enlarged inguinal, cervical, and sub-maxillary lymph nodes, hard tumors in the iliac fossae, and abdominal lumps suggestive of a bilateral enlargement of the kidneys. The presence of a tumor in the abdomen and metastases in the skull suggested hypernephroma, and the curious color of the child was in favor of chloroma. Both types of case are apt to begin with anemia, or with a tumor of the orbit leading to exophthalmos. Some cases of chloroma are ushered in with facial palsy. But although the blood picture is not constant in chloroma, it is generally a lymphemia of large cells, and the disease is sometimes regarded as a tumor of myeloblasts, arising primarily in the bone marrow and causing metastases. In this patient the blood-picture was one of a secondary anemia with a reversion of the blood to a more infantile type, as so often occurs in diseases in early life. During life the diagnosis of chloroma was considered uncertain, and the case was looked upon as more likely to be one of hypernephroma with secondary metastases. C. A. LANG.

CAMPBELL, HARRY: THE ETIOLOGY, PREVENTION AND NON-OPERATIVE TREATMENT OF ADENOIDS. (*British Journal of Children's Diseases*, July-September, 1919, p. 140).

The author considers as the immediate cause of the hyperplasia of adenoid tissue, some defect in the plasma bathing the individual cells. The central factor in the causation is intestinal indigestion, due mainly to an excess of imperfectly insalivated starchy food. This intestinal indigestion gives rise to the plasmic

defect by the absorption of intestinal poisons. As a result of this toxemia the tissues are saturated with poisons and nutrition suffers. In consequence of this, the resistance to microbic infection is lowered, especially noticeable in the case of those microbes which give rise to catarrh; there is a pronounced tendency to catarrhs of the nasal passages, nasopharynx, bronchi and intestines. These microbes generate toxins which, when conveyed to the related adenoid tissues, cause the latter to take on hyperplasia. Thus catarrh of the mucous membrane related to the pharyngeal tonsil tends to cause hypertrophy of the latter namely adenoids. He also considers defective mastication as an important factor in the causation. This may operate injuriously in 3 different ways: (1) If the jaws are not adequately used in mastication, the nasal passages and nasopharynx fail to develop properly, and it is generally acknowledged that adenoids occur more frequently in those in whom these parts are ill-developed than in others. (2) Vigorous mastication promotes the flow of blood and lymph in the nasopharynx and related parts and thus tends to establish a healthy condition of the mucous membrane lining them; defective mastication has the opposite effect; (3) Defective mastication, implying as it does imperfect salivary digestion, promotes intestinal indigestion. In order to diminish the prevalence of adenoids dietetic customs should be altered. Crusty bread should be substituted for the spongy article; puddings should be limited to one or two days a week, and the quantity of sugar should be kept within reasonable limits. On the other hand, more raw vegetable food should be consumed in the shape of salads and fruit.

C. A. LANG.

DENIS, W., and TALBOT, FRITZ B.: A STUDY OF THE LACTOSE, FAT AND PROTEIN CONTENT OF WOMEN'S MILK. (*American Journal of Diseases of Children*, August, 1919, p. 93.)

While the limits and variations in the fat and protein content of human milk are well established, considerable uncertainty still exists regarding the question of the amount of lactose in this fluid. Denis and Talbot, during the past year, have by the help of the titration method, collected data regarding the lactose fat and protein content of human milk and have summarized as follows:

- (1) There is a rapid increase of lactose during the first few

days when colostrum changes into milk, and a further increase as lactation progresses. The reverse is true of protein which, after the first rapid decrease during the change from colostrum into milk, tends to further decrease during the course of lactation. After the colostrum period, there does not seem to be any relation between the stage of lactation and the amount of fat in the milk.

(2) There is usually a higher percentage of lactose at the beginning of a single nursing than at the end. Although this difference may be one or more per cent., it is usually less. It is almost the rule for the percentage of fat to be much higher at the end of nursing than at the beginning. There is very little, if any, difference in the protein.

(3) The milks taken simultaneously from both breasts of the same woman tend to have the same composition, but often vary in respect to the percentage of fat.

(4) Toward the middle or later afternoon the volume of milk in a woman tends to diminish. The percentage of fat is as a rule higher at mid-day or mid-afternoon than at other times of the day.

C. A. LANG.

ALLAN, JAMES W.: PRENATAL TUBERCULOSIS. (The Glasgow Medical Journal, January, 1920, p. 1.)

The author believes that ante-natal tuberculous infection is more common than generally supposed and deplors that the pendulum of medical opinion has swung so violently toward the doctrine of contagion. In support of his contention he quotes the evidence contributed individually by Bonney and Warthin relating to intrauterine infection, through the placental circulation, and Baumgarten's views relating to direct transmission of the bacilli in utero.

L. L. SHAPIRO.

FINNEGAN, FRANCIS A.: INSTITUTIONAL CONTROL OF DIPHTHERIA. (The Boston Medical and Surgical Journal, January 22, 1920, p. 93.)

Citing the success of protection obtained in two Massachusetts institutions, and in New York by Park and Zingher by actively immunizing with toxin anti-toxin in positive Schick cases, which after two or more years showed negative re-Schick tests, Finnegan suggests the application of this test to a community. In this way, the knowledge of the permanent immunes and the immuni-

zation of the susceptible ones would control a disease, which continues to be one of the biggest issues of preventive medicine.

L. L. SHAPIRO.

CHODAK, HAZEL H.: A CASE OF CHOREA COMPLICATED BY GANGRENE OF THE FINGERS. (*British Journal of Children's Diseases*, July-September, 1919, p. 148.)

The author records a case in a girl aged 12 years. The patient suffered from a moderately severe attack of chorea, all parts of the body being affected. There was very little loss of strength on the left side, but the right hand grip was poor and feebly sustained. The apex-beat of the heart was found in the fourth interspace, half-an-inch inside the nipple line. A soft blowing murmur accompanied the first sound at the apex, and was transmitted a short way toward the axilla; the second sound was accentuated at the base. Ten days later the right hand began to go white, the finger nails blue. The onset was rapid rather than sudden, and it was fully a week before gangrene of the finger-tips and ball of the thumb had definitely set in. The pallor gradually spread up the forearm and the pulse disappeared from the wrist, but the brachial artery could be felt pulsating about half-way down the upper arm, and after a time there was distinct pulsation in the superior profunda artery. The pain which was gradual in onset, became very severe after the first few days. The cardiac signs became more marked and finally the apex beat was displaced slightly outside the nipple line. Later still the brachial pulse slowly disappeared from below upwards and the brachial artery could be felt as a thick cord along the arm. The choric movements subsided rapidly after gangrene was established and the heart signs also disappeared. The little finger recovered and lines of demarcation gradually formed in the remaining fingers. The ball of the thumb appeared at first to have escaped as the discolored skin peeled away from it, but it subsequently appeared that there had been damage to the muscles of the thenar eminence, which, followed by contraction of the scar tissue, led to considerable deformity of the thumb. He gives as the possible causes of the gangrene (1) embolus; (2) arteritis leading to thrombosis; (3) arterial spasm resembling Raynaud's disease.

C. A. LANG.

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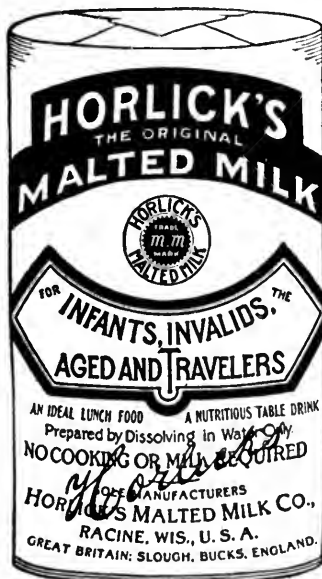
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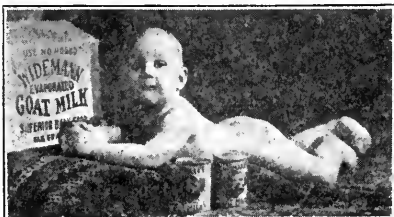
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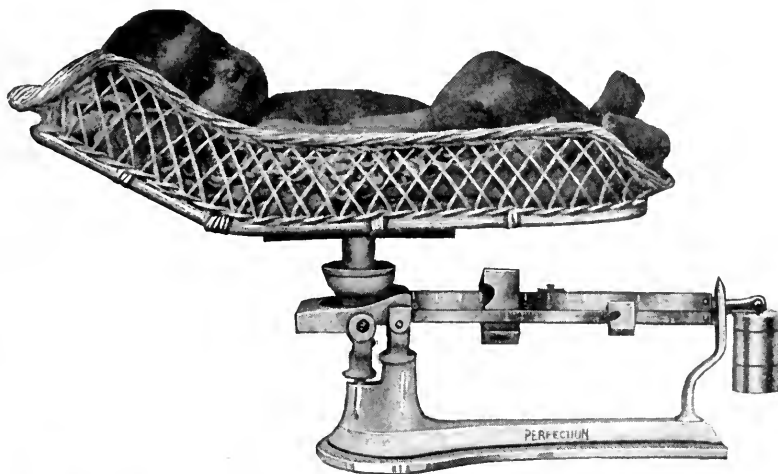
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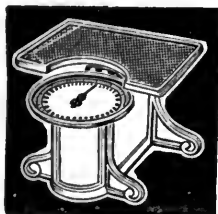
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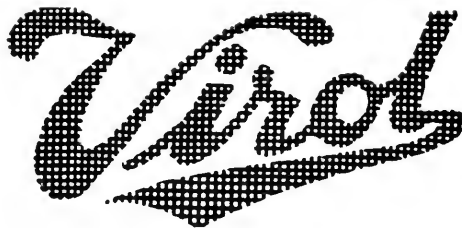
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EDITORIAL NOTE

With the December number, ARCHIVES OF PEDIATRICS will inaugurate a special Clinical Department which will appear from time to time during the forthcoming year, as warranted by the material offered. This will comprise short reports of interesting clinical cases. Subscribers to ARCHIVES are cordially invited to submit reports to this department. Other features of interest for the new year will be semi-annual letters on current pediatric progress in England and France, and a special English number of ARCHIVES, which will appear in March. It is the opinion of the editor that these new features, and in particular the Clinical Department, will prove of great value, not only to the general practitioner but also to the man who is specializing in pediatric work and who is more interested in the purely clinical side of pediatrics in contradistinction to the laboratory and experimental side. It is our intention to devote somewhat less space to the various society reports, and more space to original articles. and, to a lesser degree, to abstracts and book reviews.

ORIGINAL COMMUNICATIONS

ACUTE OTITIS MEDIA IN INFLUENZA FROM THE PEDIATRIC STANDPOINT

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This subject of acute otitis media is an especially important one for the pediatrician. Its importance has been clearly understood by some pediatricians and many otologists; but in spite of the tremendous prevalence of acute otitis media, there is an appalling lack of definite understanding on the subject, as especially related to children and infants. That you may realize that I am not alone in this view I wish to give a few quotations: Dr. Charles Hunter Dunn¹ says: "Infection of the cavity of the middle ear is one of the commonest affections of infancy and early childhood and is frequently met with in older children." Dr. Charles P. Grayson², from the standpoint of the otologist, says: "Diseases of the tympanum comprise fully two-thirds of all the diseases of the ear." Of acute otitis media, Dr. C. G. Kerley³ says: "The disease is of much more frequent occurrence in children than adults. The younger the child, the greater the apparent susceptibility. Otitis in young children is probably more frequently overlooked by the practitioner than any other disease of childhood; it is because of its indefinite manifestations, and the faulty teachings of the text books as to the symptomatology of the disease."

That the incidence and diagnosis of acute otitis media is not well understood is clearly shown by the large number of cases sent to the children's hospitals with diagnoses of pneumonia, meningitis, etc., which, on careful examination, are found to be acute otitis media. I well remember the first time an electric otoscope was used in the medical wards of the Children's Hospital, when 4 cases, diagnosed as central pneumonia, turned out to be acute otitis media.

In September, 1918, I saw a boy of 6 months who had had a temperature of 104° to 106° for 5 days previous and who had been seen by 3 physicians and diagnosed central pneumonia. The

ears had been examined twice previous to my visit but nothing had been found. An examination of the chest and throat was negative. Otoscopic examination showed markedly bulging white ear drums; both ears were opened and a large quantity of pus escaped, the temperature falling to 102° in 2 hours. The child fortunately recovered without any mastoid complications.

In one afternoon medical dispensary at the Children's Hospital, out of 20 medical cases there were 3 cases of acute purulent otitis media and one of acute purulent otitis media with marked mastoid symptoms. The latter case, a 5 months infant, had been seen one day previous when the temperature was 104° and the only symptoms were those of enteritis. No otoscopic examination had been made; but a note was made of a normal chest. Diagnosis at the first visit was intestinal influenza. When seen 24 hours later, the left ear drum was a brilliant red and markedly bulging. There was tenderness over the mastoid tip with edema and a temperature of 104°. On incision of the ear drum, there was a free flow of pus. The child was admitted to the hospital ward and died 2 days later of mastoid abscess. From the above you can easily understand that acute otitis media is a very common disease of infancy and childhood, often not properly diagnosed and treated. With this in view let us now briefly consider acute otitis media, especially in relation to influenza.

Otitis media may be divided into (a) acute catarrhal or non-suppurative; (b) acute suppurative otitis media; though from a practical standpoint this classification is of little importance.

Etiology. Otitis media is almost always an extension by continuity, through the eustachian tube, of an infective process in the nasopharynx, therefore it is very seldom primary. Adenoid vegetations, diseased tonsils and nasal obstructions are contributing factors. Owing to the patency of the eustachian tube in infants and children and the tendency to adenoids, enlarged tonsils and throat infections, children and infants are especially liable to develop otitis media. Dentition is also a contributing factor. The suppurative form of otitis media is especially liable to affect infants and children as it is a frequent complication of the more common children's diseases—measles, scarlet fever, diphtheria, pneumonia, typhoid fever and influenza. Dr. S. MacCuen Smith¹ says: "Measles and influenza are probably productive of more serious aural disturbances than any other diseases

combined. This is especially true of influenza as is shown by the fact that, before its advent, tympanic and mastoid inflammations, requiring operative intervention, were comparatively rare, whereas at present these are among our most common diseases."

It is with the acute otitis media of influenzal origin that we are especially concerned. Influenza is the commonest cause of acute otitis media and in most cases, of the acute suppurative type. The infection may involve children from birth to adult life but is especially frequent in infants. In acute otitis media, the bacteria may be the streptococcus, staphylococcus, pneumococcus, Klebs-Loeffler, and influenza bacilli. On examination of a purulent ear discharge, a mixed infection is often found in which other organisms than the inciting ones may predominate, so that frequently an influenzal ear infection may show few or no influenzal bacilli in the discharge, other organisms predominating and overgrowing them. In some severe cases, however, we may obtain a pure culture of influenzal bacilli.

Lesions and Pathology. Infection in the nasopharynx enters and travels along the eustachian tube into the ear, often causing merely a hyperemia and swelling of the eustachian tube, and a hyperemia of the tympanic cavity with varying degrees of hyperemia of the drum membrane. The hyperemia is followed by the formation of a thin, bloody or straw-colored serum, which still later may become purulent. The infection may end in any one of these stages. Otitis media, due to an influenzal infection, is very prone to rapidly become purulent. In influenzal otitis media, owing to the large numbers and virulence of the bacteria, the cellular tissue of the tympanum is involved and in most cases the mastoid antrum as well. All cases with a profuse purulent discharge involve the mastoid. The pus, if not evacuated by operation, in most cases ruptures through, and causes sloughing of the drum membrane. This takes place in from 1 to 4 days in severe cases; in mild, purulent cases, 10 to 14 days, discharging profusely 1 to 2 weeks, then subsides. In 3 to 4 weeks it ceases in the average case. The ear ossicles and bony walls of the ear may also become involved and later we may have mastoiditis, sinus thrombosis, pachymeningitis, brain abscess, etc.

Symptomatology. No more erroneous statements can be made than those in the average text books on ear diseases. That infants and young children, who are the most commonly affected

of all the classes of otitis patients, have an entirely different symptomatology from adults, does not seem to be considered. The symptomatology in infants and children is most varied and often vague. I shall simply mention the important symptoms and review briefly their variations. The most constant symptom of acute otitis media is elevation of temperature ranging from 100° to 106° , though the usual range is from 100° to 103° . Dr. L. E. Holt⁵ says of otitis media: "Of all the inflammatory conditions which may be met in early life, there is perhaps none which more frequently gives rise to obscure febrile symptoms." Often one is called to see an infant or older child, who is quite restless, cries day and night, without cause, will not take any food, and has a sudden rise of temperature, from 101° to 103° or higher. On close examination, one may determine that 3 to 7 days prior, the child had a rhinitis, was exposed to influenza, or had a mild attack of grippe. General examination discloses nothing. On otoscopic examination, a well-marked acute otitis media will be discovered.

Then again you may see a child with apparently all the symptoms of a pneumonia—rapid respirations, high temperature, rapid pulse, dilating alae. At first sight, anyone would be inclined to diagnose pneumonia, especially if the infant or child had been sick a day or two with undoubted influenza. The examination of the chest, while it would not give any definite signs, would not eliminate a central, or more correctly speaking, a peripheral pneumonia, as the clinical signs might not be capable of determination so early. A careful otoscopic examination in experienced hands will often make the diagnosis of an acute otitis media plain. One has to be on one's guard as often one will be treating an infant or child for influenza or influenzal pneumonia where the temperature, being already elevated, will not be an aid in diagnosing acute otitis media. Just a few days ago an infant, evidently very sick, with a temperature of 102° , and respirations of 30, was brought to the dispensary. Examination: Ears, mouth, throat and chest were negative and a tentative diagnosis of influenza was given. Two days later I saw the infant, who then was quite sick, face and both extremities showed considerable edema, the temperature was 101° , respirations 50, weight 17 pounds, 1 ounce, alae dilating, mouth and throat negative. The chest, posteriorly on the right from the spine of the scapula to the base, was very

dull and bronchial breathing was marked over the same area, no râles. There was an easily diagnosed pneumonia. Ears: Both external auditory canals were small with numerous hairs and a large amount of wax. The wax was partially removed; the ear drums were a normal color, no evidence of congestion and to all appearances concave and normal. As the child was so sick, a more extended examination was made and the ear drum was found to be opaque and the normal light reflection absent, but there was no bulging. Both ears were incised and thick pus exuded through the incision.

On the other hand do not expect an elevated temperature in all cases of uncomplicated otitis media. A child of 4 was brought to me because the parents thought he seemed dull and did not hear well, possibly on account of adenoids. Examination of the nasopharynx was negative and otoscopic examination revealed nothing abnormal. The temperature was normal. The condition remained the same, the child being examined for 3 consecutive days, when the ear drum became distinctly reddened and showed slight bulging, but no elevation of temperature. On incision of the ear drum, there was a flow of clear straw-colored serum and the child's hearing gradually returned to normal.

After spontaneous rupture or incision of the ear drum, the temperature usually falls promptly, though a slight elevation may persist for a short time. A persistent high temperature, after a paracentesis, means either an incomplete drainage, due to too small an opening or too thick discharge, or that there is a complication as mastoiditis, meningitis, etc.

Elevated temperatures in children and infants, whenever the cause is not clear, demand otoscopic examination. While it is not safe to expect an elevation of temperature in every case of acute otitis media, in the influenzal type it is almost always found.

Next to temperature, pain is the most reliable symptom of acute otitis media. While in older children you often have complaints of distinct and violent ear-ache, and in infants pain is sometimes exhibited by restlessness, fretfulness, crying and sleepless nights, many times in acute otitis media no such symptoms are found, especially if the otitis media is a complication of some other disease. The severity of the general condition overshadows all local symptoms of pain. There are many cases, especially in

infants, in which pain does not seem to be a factor, in fact, evidence of localized pain in the acute otitis media of infancy is more often lacking than present and is a very unreliable symptom, and even older children often fail to show pain. This lack of pain does not seem to be clearly understood, one often hearing a physician say: "I did not think the child had ear trouble; he did not show any sign of pain in his ear." Pain when found in acute otitis media is a valuable aid in directing one to a correct diagnosis, but its absence should never cause one to fail to examine the ears of a sick child. As a rule the degree of pain depends on the acuteness of the inflammation, but even more especially varies with the amount of pressure exerted by the secretion pressing on the ear drum. Often in infants the first evidence of acute otitis media is a purulent discharge without any evidence of pain. Older children experience more pain on account of the greater density of the drum membrane causing it to rupture later. In a few cases there will be pain or tenderness in front of the external auditory meatus or over the mastoid antrum. There are cases in which there is severe agonizing ear-ache, which subsides, without apparent cause, often to return again later. This process may be repeated one or more times and finally recover without perforation of the ear drum. Here you have a purulent otitis media which, by its own pressure and the resistance of the ear drum, forces the purulent material down the relatively large eustachian tube into the throat. Older children describe the pain of acute otitis media as stinging. The pain is usually paroxysmal, worse at night and often associated with deafness and noises in the ear.

Prognosis. Almost all cases of acute purulent otitis media, with early diagnosis and prompt treatment, recover without any complication or subsequent involvement of hearing. Repeated attacks of acute otitis media, no matter how well treated, eventually cause middle ear catarrh, with impairment of hearing, hence the importance of removing tonsils, etc., as a form of preventive treatment. In severe cases, (very few) mastoiditis, involvement of the internal ear, facial paralysis, sinus thrombosis, meningitis and brain abscess may develop. The facility with which meningitis may be occasioned is explained by the close anatomical relation between tympanic and cranial cavities through the medium of the petrosquamous suture in infancy. In infancy, previous

to the closure of the fissure, a duplication of the dura mater projects through it into the tympanum and blends with the muco-periosteal lining of the cavity.

Diagnosis. The symptoms of acute influenzal otitis media are often very obscure. Temperature, while usually present, is by no means always found. Pain is a valuable aid but its absence is of no diagnostic value. Leucocytosis in influenzal otitis media is late usually when there is a complication, as mastoiditis or sinus thrombosis. In uncomplicated influenza otitis media in 1918, we found the count was usually 8,000 to 10,000, contrary to the usual text-book figure of 15,000 to 20,000. As a diagnostic aid the white cell count is of no value except to aid in determining the onset of mastoiditis and sinus thrombosis.

A sudden elevation of temperature or persistence of temperature in the course of an influenzal infection should cause one to suspect otitis media.

The temperature curve has no particular characteristics and the onset of acute influenzal otitis media is similar to the onset of any severe infection and may be accompanied by vomiting, diarrhea, convulsions and a long train of symptoms none of which are in any way characteristic of otitis media.

In a word, the diagnosis of acute otitis media comes down to this, every physician treating children should understand and carry out careful otoscopic examination on every infant and child who has a temperature, and at frequent intervals during the course of every case of influenza. As the definite symptoms of ear involvement are so often lacking, it is only by careful otoscopic examinations that acute otitis media can certainly be recognized. The technique with a modern electric otoscope is comparatively simple.

The more common appearances of the ear in acute otitis media are easily recognized. You may have simply an intensely hyperemic drum head, a hyperemic and bulging ear drum, or a dull, lusterless, white, opaque, bulging drum, or a bulging, opaque, white tympanic membrane with distinct lines of clear cut red blood vessels running in from the periphery toward the center of the drum, which appears as a dimple; or you may find a condition seldom seen in any other infection than influenza, an intensely red drum with what appears as localized, highly raised, deeply injected blebs, where the drum head joins the canal wall,

situated usually in the posterior superior quadrant and often extending down into the posterior inferior quadrant. Unless you carefully cleanse the external auditory canal of all waxy secretion and epithelial scales, especially around the posterior margin, your inspection will often fail to reveal the bulging drum where it is easiest seen. It is also important, with a cotton-tipped applicator, to wipe out any loose epithelium, lying right over the drum, which often gives the appearance of a normal ear drum, when in reality the true bulging red drum lies beneath.

In infants especially, where the auditory canal is relatively small and the hairs numerous, great care must be used not to overlook a diseased ear drum.

Mastoiditis as a complication should be suspected in the course of an acute otitis media when there is a rise of temperature with increase in general symptoms with no explainable cause in the ear or infection elsewhere. Also suspect mastoiditis when, after a paracentesis or rupture of the ear drum with a free discharge, the temperature does not drop. An increasing leucocyte count, tenderness back of the auricle and, on inspection, a drooping of the posterior wall of the external auditory canal wall give further confirmation of mastoiditis.

Treatment. The treatment depends on how early the case is seen. If very early and the ear drum is slightly red and no bulging, it is often well to apply, on an applicator through the nose, a 1-2000 adrenalin solution in a 2 per cent. solution of cocain, directly to the eustachian orifice, followed by an application of 25 per cent. argyrol solution. This treatment can be repeated daily and, in addition, an oil may be dropped into the nose every third hour. With the local treatment combine purgation, light diet and absolute rest in bed. The ear may be syringed with hot boric acid solution, though I prefer not as it obscures the progress of the case; better use a 5 per cent. carbolic solution in glycerin in the ear.

The ear should be examined at least daily and better oftener and if in 24 hours symptoms are more marked or ear drums appear more acutely inflamed, or if there is any bulging of the drum head, perform immediate paracentesis. The importance of early incision of the ear is well expressed by Dr. S. MacCuen Smith⁴ as follows: "The most important procedure, therefore,

is the early and free incision of the membrana tympani, and, although the rule still prevails, in the usual case, to wait until the drum head bulges, this is a late and unsafe indication in acute suppuration of the middle ear complicating the exanthemata and influenza. It is best therefore, in all severe infections, to incise the membrana tympani early, as this is our best means of preventing additional complications. When the case is seen sufficiently early, the drum head should never be allowed to rupture spontaneously, as it is in such cases that complications most frequently occur." If rupture has already taken place be sure that the opening is large enough to afford good drainage, otherwise enlarge it.

Paracentesis requires surgical cleanliness and in most cases is a decidedly painful operation. Carefully remove all the wax and loose epithelium and with an applicator place in the ear a small pledget of cotton, wet with a solution of equal parts of menthol, cocain and carbolic acid crystals, and leave it in contact with the ear drum for 5 minutes. This will both anesthetize thoroughly the drum and sterilize the external auditory canal. After removal of the cotton pledget, with a straight bistoury bladed paracentesis knife, make a clean, curved incision in the ear drum, beginning in the lower posterior quadrant near the canal wall and extending well up for one-quarter of the circle into the upper posterior quadrant. If there is a free flow of blood, serum, or thin pus, wipe out with an applicator, then apply 5 per cent. carbolic acid in glycerin and plug the ear loosely with sterile absorbent cotton. A word of caution: Do not force the point of the paracentesis knife too deeply through the ear drum and injure the bony wall beyond, nor extend the incision too far up and injure the ear ossicles.

When the discharge is thick and will not flow out through the incision, use slight pneumatic suction and then treat with 5 per cent. carbolic solution as before. Do not irrigate the ear, especially if there is a bloody or serous discharge.

Dr. Francis B. Packard^e says: "If the middle ear is free from pus and the wound does not become infected, the incision will as a rule heal completely within 48 hours. It is of the utmost importance in catarrhal cases to refrain from syringing the ear after the performance of a paracentesis. The introduction of

fluid into the ear under these circumstances almost invariably results in establishing a suppurative otitis media."

I think that this statement is also equally true of the suppurative forms of otitis media. By irrigation you are liable to cause a secondary mixed infection and greatly increase the danger of severe complications.

Almost all text-books advise irrigation of abscessed ears after incision, second, third or fourth hour, with hot aseptic or antiseptic solution. Up to December, 1918, I used the same treatment, varying it with wick drainage in some cases, but since December I have in no instance used irrigations and have had many less complications, in fact no operative ones, and the general course of the otitis cases has been much shorter.

The after-treatment consists of daily inspection of the ear, mopping out any pus and, if very thick, an occasional application of pneumatic suction, then the application of 5 per cent. carbolic acid in glycerin to the ear drum and external canal. A sudden cessation of discharge, usually with increased constitutional symptoms, demands immediate inspection of the ear and, if there is the slightest doubt as to good drainage, do a paracentesis at once, followed by pneumatic suction if necessary.

If the drainage is not good or the drum bulges, the opening is enlarged. Frequent paracentesis may be necessary during the course of the case, without any subsequent bad effect on the hearing, in fact safeguarding the membrana tympani from catarrh, with thickening of the drum.

Early incision may be followed by a bloody discharge, without any pus. The paracentesis however usually gives marked and immediate relief. When in skillful hands and with surgical care, it is better to err on the side of operation rather than delay. Dr. L. E. Holt⁶ expresses it very clearly when he says: "The advantages of early paracentesis in acute otitis media can hardly be overstated. I favor incising the drum membrane in cases of doubt rather than waiting for more definite indications, with the attendant risks of delay."

Whenever there is long continued very profuse discharge, long continued elevation of temperature, after a free incision of the ear drum, or mastoid tenderness, or edema, place an ice bag just back of the ear. Do not be deceived by the fact that many text-books lead to the assumption that mastoid cases are not

found in infants. During this last year I saw 8 operative mastoid cases in infants from 9 to 15 months of age. All these infants had perfect recoveries by early operation, with no impairment of hearing.

In acute cases of otitis media, which in spite of daily cleansing and the application of 5 per cent. carbolic acid in glycerin, and paracentesis whenever the drum bulges, show a continued high temperature, or the leucocyte count suddenly rises, suspect mastoid involvement, even if no mastoid tenderness or edema is present.

Some cases have a persistent discharge in spite of any treatment, though the temperature be normal. These cases bring up the question of the use of vaccines. So far there is no reliable evidence of the value of either stock or autogenous vaccines in either the acute or chronic forms of otitis media.

Following an attack of acute otitis media, to prevent subsequent trouble, see that diseased tonsils and adenoids are removed. A year ago a case of discharging otitis media of 4 months duration, which would not get well under any local or constitutional treatment, cleared up the day following the removal of the tonsils and adenoids.

SUMMARY. The symptoms of acute otitis media are so vague, the number of cases so numerous, especially since the advent of epidemic influenza, that every infant and child, with a temperature, or with any of the exanthemata, or influenza should have careful and repeated otoscopic examinations. If these cases of otitis media are diagnosed and properly treated there will be many less people with catarrh of the middle ear and impaired hearing, and the number of operative mastoid cases will become a negligible quantity. Diagnose carefully, treat early and never await spontaneous rupture of the ear.

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THE ETIOLOGY OF CHOREA

REPORT OF A RELAPSE ACCOMPANIED BY A PERITONSILLAR ABSCESS*

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Since the definite etiology of chorea has not been established, any observation on the appearance of a definite lesion with the development of chorea would appear to be of value from the suggestive standpoint. This case is reported because it demonstrates the causative relation between the development of choreic symptoms and a septic focus in the tonsil. A child with chorea, who had so far recovered that twitchings had ceased, suffered an attack of acute tonsillitis with a subsequent peritonsillar abscess. Coincident with the development of these complications, the nervous symptoms returned with greater intensity than upon entrance and as suddenly disappeared with the rupture of the abscess and the subsidence of the tonsillitis. It is interesting to note that there was a history of frequent tonsillitis but no history of rheumatism. In the medical management of the case there occurred a skin eruption following the administration of veronal.

CASE REPORT. The patient was a girl of 10 years, admitted to the service of Dr. I. A. Abt for muscular twitchings, inability to hold objects and a speech disturbance. The disorder began 3 months before in the form of restlessness. Later there occurred twitchings of the right shoulder. These jerky movements extended to the legs so that she could not stand still. The arms were involved so that she could not hold a cup without spilling its contents. She was awkward in feeding herself and spoke in a halting manner. She had had frequent attacks of tonsillitis, measles 5 years before, whooping cough 7 years before, and had suffered fractures of both arms and scalp wounds in a street car accident 4 years before. Five other children in the family were living and well. There were no miscarriages.

Physical examination revealed a well-nourished child who did not appear acutely ill. She was extremely fidgety and tossed from one side of the bed to the other. She grinned throughout the examination and appeared contented. There were gross tremors of the fingers when extended and parted, coarse twitchings on

* From the Sarah Morris Memorial Hospital.

both sides of the body and jerky, slurred speech. The tongue, also, exhibited a coarse tremor. There were many decayed stumps of teeth, and the tonsils were enlarged and buried behind the pillars. Cervical adenopathy was not marked. There were no remarkable cardiac findings save an accentuated second pulmonic tone.

Repeated urinary examinations yielded no pathological findings, and a catheterized specimen was negative for bacteria. The throat culture contained a variety of the common organisms but no diphtheria bacilli. There were 4,800,000 erythrocytes, and of 13,200 leucocytes on entrance there were 67 per cent. neutrophils, 20 per cent. lymphocytes, 9 per cent. large mononuclears, 2 per cent. eosinophiles, and 1 per cent. transitionals. The hemoglobin was 70 per cent. Systolic blood pressure was 90; diastolic 58; and pulse 32. Rectal temperature varied between 99.2° and 100°. Pulse was 88 to 112; and respiration 20 to 24.

Initial treatment consisted of absolute rest in bed isolated from the other children. She was given a wet pack for 20 minutes every 4 hours for a week and an enema daily. Fowler's solution was given in increasing and diminishing doses from 1 to 5 minims 3 times a day for 2 weeks. After an interval of 2 weeks she was given 2 grains of veronal 3 times a day for 10 days. The child developed a diffuse, erythematous, maculopapular rash, particularly on the forearms. There were some lesions on the cheeks and a few on the legs. In a few days the eruption disappeared. Luminal was administered for 1 week after a pause of 10 days following the veronal.

Three weeks after entrance, the nervous symptoms had practically subsided. One month after entrance the pulse became irregular with a pause after every third or fourth beat. Occasionally the first systole after the pause was rough. Seventeen days after the irregularity was observed, the electrocardiograph still showed a slight arrhythmia with a normal cardiac mechanism. A routine white count 7 weeks after entrance showed 9,600 leucocytes. A few days later she complained of headache and sore throat. The tonsils and pillars were red and angry. The twitchings returned with greater intensity than they had ever shown. There was pain in the left ear. The temperature was 103°, pulse 146, and respirations 20. The leucocyte count was now 16,600. The throat cultures contained streptococci but no diph-

theria bacilli. Four days after the onset of the tonsillitis there was slightly more prominence of the left side of the throat, and adenopathy and tenderness were more marked on the same side. The white count was now 28,400. The next day the bulging on the left side was more marked, and later in the day the abscess burst spontaneously with prompt relief of the symptoms in the throat. Simultaneously the twitchings ceased, and the child rested quietly proceeding to recovery.

DISCUSSION

Although no specific agent can as yet be ascribed to chorea one may conclude from the literature that an infectious factor is at work. Many observers have isolated organisms from the blood, spinal fluid and brain tissues. The findings, however, are inconstant, and the organism is not the same. Westphal, Wassermann and Makoff¹ isolated a diplococcus from the spinal fluid which produced polyarthritis in rabbits. Paines² found a diplobacillus and a diplococcus and was able to produce experimental chorea by injection of cultures of these organisms. Poynton and Paine³ isolated a diplococcus from a joint in rheumatism which produced polyarthritis, endocarditis and chorea in animals. Preobrazhensky⁴ isolated a streptococcus in a severe case successfully treated with antistreptococcus serum when sedatives failed. In this case it would be difficult to determine that the recovery was not spontaneous. Reichhardt⁵ found a staphylococcus in the blood in a post-mortem examination of a case. This may easily have been an agonal invasion.

The brain, itself, has been sought as the focus of infection. Gowers⁶ expressed the opinion that chorea was due to a toxic, infectious lesion of the cerebellum not sufficient to cause gross anatomic changes. Griffith⁷ reports the recovery of bacteria from the cerebral tissues in 2 fatal cases. The finding of organisms in the blood or in the brain tissues is exceptional. Many believe that there is no conclusive evidence that the organisms found are concerned in the production of the symptoms of chorea despite the reports of animal inoculation. Oppenheim⁸ believes that the evidence of microorganisms in the brains of choreic cases supporting the theory of cerebral infection is scanty and uncertain.

For the most part rheumatism is credited with preparing the soil for the production of chorea. Cheadle early called the atten-

tion of medical men to the relation of tonsillitis, endocarditis, rheumatism and chorea. Since his time the conception has remained. Hirt⁹ states his position this way: Chorea is the result of a toxic agent which affecting the cortex produces chorea and affecting the joints causes rheumatism. Wollenberg terms it a metarheumatic affection. Duckworth calls it rheumatism of the brain; and Heubner regards chorea as the rheumatic equivalent. Still¹⁰ believes that the post-scarlatinal cases of chorea belong to the rheumatic group because in his experience such cases are usually accompanied by other manifestations of ordinary rheumatism.

The prominence of the rheumatic factor leads to a consideration of the tonsil both as a source of rheumatic infection and as a portal of entry. Dunn¹¹ states that there is strong reason for believing that chorea is one of the manifestations of tonsillar infection while Chapin and Pisek¹² remark that hypertrophied tonsils are associated with the disease. Graham¹³ suggests that the organisms gain entrance through the tonsil. Jochmann¹⁴ states that the tonsils frequently contain plugs of caseous material in the lacunae and that this is the seat of the chronic infection. When these foci are removed he maintains that the disease clears up. Morse and Floyd¹⁵ found diseased tonsils in 42 per cent. of cases. Abt and Levinson¹⁶ reviewed 135 cases of which 35 per cent. gave a history of tonsillitis.

CONCLUSION

The case reported here is unusual because it illustrates a relation between the development of choreic symptoms and the formation of an acute tonsillitis and a peritonsillar abscess. Granting the presence of a nervous, in this case choreic, basis, we should conclude that the relationship is, at least, of an exciting nature.

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END RESULTS OF TONSILLECTOMY*

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The following is a statistical report of 500 consecutive cases of tonsils and adenoids operated upon by the Second Surgical Division of the New York Hospital from April 1, 1915, to October 1, 1919. The end results are arrived at through our Follow-Up Clinic. It has been our endeavor to follow all cases for one year after their discharge from the hospital, the first examination taking place in 3 months, and subsequent examinations at such intervals as seems of interest to the surgeon or importance to the patient. All cases are personally seen by one of the attending surgeons, except in those instances where it is impossible to have the patient return. Reports based solely on letters or visits by our Social Service nurse are not classed as end results.

On each return to the Follow-Up Clinic, a careful history is taken. This covers the progress of the patient since the discharge from the hospital or from the time of the last examination. Emphasis is laid on the gain or loss in weight and strength; occurrence or frequency of sore throat; change in breathing, voice or hearing. The patient is then examined by one of the attending surgeons and notations are made of any remaining tonsillar tissue, the condition of the pillars, fauces and uvula. The breathing is noted and presence or absence of ear discharge is looked for.

The result at each examination is put down, but not classed as an end or final result until the patient is discharged from the Follow-Up Clinic. This tentative result is classified under 2 headings: "The Anatomical Result," and "The Symptomatic Result." Under each heading we classify again: "Good, Fair or Poor." Consequently a patient may have a good symptomatic result and a poor anatomical result.

Of the total 500 cases, 394 or 79 per cent. have been followed for an average period of $5\frac{1}{2}$ months. 106 cases or 21 per cent. were lost, or observations were based solely upon the re-

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For the privilege of collecting and reporting this series of cases, I am indebted to Dr. Eugene H. Pool, Attending Surgeon of the Second Surgical Division.

ports of the Social Service nurse. Of the 394 cases, 327 or 88 per cent. were children referred to the Service by local school boards, or public health officers for frequent sore throats, faulty breathing or simple hypertrophy. The remaining 44 cases were admitted for other complaints. In some of these cases the tonsils or adenoids were an independent or a relatively minor lesion; in others, they were apparently an etiological factor of an infectious process elsewhere.

In 26 cases, the tonsils were hypertrophied and were removed as a prophylactic measure at the time of an operation performed for an independent condition, such as: circumcision, hernia, chronic appendicitis and Pott's fracture.

The cases in which the tonsils and adenoids acted as a contributory or an etiological factor were: tubercular lymph nodes, 8; arthritis of knee, 3; chronic valvular disease, 2; chorea, 2; chronic otitis media, 3; 18 in all.

Of the 394 cases followed, 97 per cent. were reported symptomatically good and 3 per cent. as fair. Anatomically, the results were 84 per cent. good, 10 per cent. fair and 6 per cent. poor.

In the 3 per cent. reported as symptomatically fair, the complaints were as follows: Two complained of frequent sore throats; 1 of difficulty in breathing and 2 as not being benefited by the operation. One of the 2 complaining of frequent sore throats had a recurrence of tonsillar tissue, was operated on secondarily, and was later reported as good. The case that complained of difficulty in breathing had, on examination, a deviated septum and was referred to the Nose and Throat Clinic for treatment. The 2 cases not benefited by the operation refused further treatment.

In classifying the anatomical results, the amount of tonsillar tissue present, whether in one or both fossae, the condition of the pillars, the ease of breathing and the condition of the uvula, determined the rating. If a small piece of tonsillar tissue was seen on one side, the condition was classed as fair, while if on both sides, as poor.

Taking up the results of the 18 cases in which the tonsils and adenoids were supposed to be etiologic or contributory factors, we have the following: The 2 cases of chronic valvular disease were not benefited by operation. Of the 2 cases of chorea, 1 was markedly benefited by operation for 1½ years, then had a

relapse and was readmitted to the hospital on the medical service. Since that time the patient has been lost track of. The other was not benefited. Of the 8 cases of cervical lymph nodes, 2 cleared up entirely. One of these was a man who also had syphilis and took anti-luetic treatment after his operation. Possibly his cure was due to the anti-syphilitic treatment. However, as the general opinion is that the tonsils are often the portal of entry for tuberculosis of the cervical lymph nodes, it has been our policy to perform a primary tonsillectomy and later a node dissection, if necessary. Consequently, the effect on the nodes by the tonsillectomy is not ascertained, as enough time is not given to get an end-result.

Chronic otitis media affords a brilliant field for adenoidectomy. Three cases in which the ear discharge had been present from 1 to 7 years were completely relieved of the discharge within a week after the operation, and had not recurred when last heard from 6 months after leaving the hospital.

Three cases of chronic arthritis were operated upon believing the tonsil to be the seat of the infection. One case was not benefited. The other 2 showed immediate and permanent relief from all joint symptoms, one, 2 weeks after operation, and the other 2 months after, and continued to be without any joint symptoms when last heard from 5 months after the operation.

The routine treatment of tonsil cases is practically the same in all cases. A complete physical examination, including a urine examination, and in children, a Schick test, is made on admission. If any contra-indication, as recent tonsillar or respiratory infection, is found or suspected, the operation is postponed or omitted. On the evening before the operation, castor oil is given followed by a soap-suds enema in the morning, and nothing by mouth.

The operation itself was performed in the operating room under a general anesthetic (nitrous oxide gas and ether) with only 2 exceptions, when a local anesthetic was used and the operation was performed by Dr. James P. Erskine, the consulting laryngologist. No operations were done in the Out-Patient Department, as that procedure is considered unsafe and dangerous on account of subsequent bleeding and danger of infection in an open throat.

Technique.—Since the fall of 1915 the tonsils have been

enucleated by dissection with instruments instead of by the finger. The Rose position, combined with the Hitz mouth gag and the Pool and Kenyon aspirator, with a specially designed suction tip, is used in order to get the best exposure and protect the patient from aspiration of blood, mucus and pus. The tonsils are removed by the snare and adenoids by curette, followed by finger palpation to insure a perfectly clean nasopharynx. After operation, patients are put to bed and kept quiet, special observation being kept for any undue hemorrhage. If 1 day after operation the temperature is normal, patients are allowed up on doctor's order. Children are usually kept in bed a day longer than adults, and no throat irrigations or applications are employed on either as routine.

Complications.—Complications are divided into 2 groups: early and late. The early ones comprise those arising in the hospital before discharge. The late ones are those which develop after discharge.

Of the early cases there are: hemorrhage, 5; lobar pneumonia, 1; abscess of neck, 1; diphtheria, 1; acute mastoiditis, 1.

To take up briefly the individual cases: Of 5 cases of hemorrhage, 3 necessitated a secondary procedure (which consisted of ligation of the bleeding vessel) under a general anesthetic. The other two cases were controlled by pressure. In no case was the hemorrhage severe enough to do any radical operation, or the sequelae bad enough for infusion or transfusion. The end results of all these cases were reported good. It is striking that there was only 1 case of post-operative pneumonia. This was of the lobar type and the patient had an uneventful recovery and good final tonsil result. The reasons for this relative freedom from pneumonia are to my mind:

1. Care in selection of the cases based on careful and complete physical examination.
2. Postponement of the operation after a recent tonsillar or respiratory infection.
3. Ante-operative preparation.
4. The Rose position, and the use of the aspirator during operation, preventing aspiration.
5. Post-operative observation in the hospital.

Although the Schick test was made in every child, 1 developed

diphtheria shortly after the operation. This case was transferred to an isolation hospital where it made an uneventful recovery. This child was examined and reported as a satisfactory result.

One case of acute mastoiditis developed 2 days after its discharge from the hospital. It was readmitted and operated upon for this condition; had an uneventful recovery, and 3 months later was reported good for both conditions.

Of late complications in all cases followed for at least 3 months or more, there are few to record. Lung abscess, a condition so much feared and mentioned by so many authors as a frequent occurrence after tonsillectomy, did not occur to our knowledge in any cases either followed or heard from. Late conditions noted by the examining surgeon, but not complained of by the patient, were: scar tissue contractions of the pillars and loss of the uvula (1 case).

CONCLUSIONS

1. Tonsillectomy and adenoidectomy in well chosen cases, performed by general surgeons, in a general service, under proper conditions, show 97 per cent. symptomatically good results.

2. The complications arising either early or late are few and not severe in character.

3. The benefits arising both in simple cases and those in which tonsils act as a portal of entry, warrant their removal.

4. The dangers of the operation are almost nil, as shown by the fact that there were no deaths due directly or indirectly to the operation in this series of 500 consecutive cases.

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ATYPICAL EPIDEMIC MENINGITIS (Gazzetta degli Ospedali e delle Cliniche, Milan, Nov. 30, 1919.) In G. Salvetti's two cases the onset was insidious, suggesting ordinary influenza at first. There was no vomiting, and the mind was clear throughout except just before death in one case. The temperature was always relatively low, and the lumbar puncture fluid seemed to be normal except for slight turbidity only at the first or second puncture, but the meningococcus was cultivated from the fluid in both cases. The fatal outcome in one case was a surprise after the extremely mild course in both.—*Journal A. M. A.*

LYMPHATIC LEUKEMIA, WITH REPORT OF A CASE

By A. J. SCOTT, JR., M.D.

Los Angeles.

The study of lymphatic leukemia, as reported in the current literature and in most of the text-books, seems to be devoted principally to the disease as manifested in adults. Very little is outlined of what is seen in very young children, although cases are mentioned as occurring in the young.

Briefly some salient points of the disease are:

Age. Usually according to the cases reported in the literature, from 9 years up. Ruhrah mentions a case which is reported in an infant of 16 days. Cabot¹ mentions 5 cases, 2 to 4 months of age, and 3, from 1 to 10 years. The age incidence and number of cases increase in direct ratio.

Sex. In this type of disease the males seem to predominate.

Etiology. There is no uniformity of opinion. No real cause is known for the disease. Many theories are advanced, but they all sum themselves up into 2 general ideas, namely: 1, a type of tumor with metastasis; and 2, an acute infectious process. Taking the former first, Mallory² considers it as "really a circulating tumor metastasis". Stengel and Fox³ say: "It is impossible to classify leukemia with certainty, but the evidence at present seems to justify the belief that it is closely related to neoplastic processes." MacCullum⁴ says: "The question is hard to settle satisfactorily, but in the one case the formation of cells in an unaccustomed organ, such as the liver, would resemble the mode of distribution and proliferation of a tumor. In the other we must assume that the tissues of the capillary walls of the liver, the splenic pulp, etc., are capable of reacquiring the power of blood formation which, as all agree, they possessed during embryonic life. To me the transplantation and growth of cells seems more plausible although there is some good evidence in favor of the idea of metaplasia." McJunkin⁵ says: "It was not until extensive studies were made on the organs and tissues of leukemic cases that many observers came to regard the leukemias as malignant neoplasms. The study of cases of malignant disease (lymphoblastoma) before and after the entrance of tumor cells in large numbers into the peripheral blood, aided in this con-

ception. Whatever the ultimate solution of tumor etiology may be, it is likely that the leukemias shall remain as typical examples of true tumors."

On the other hand, the advocates of the acute infection theory offer good arguments. Stein⁶ quotes Virchow in that the disease has a leukocytosis which is progressive, and an associated factor of infections. He goes on further to state that as lymphocytes have lipolytic property, possessing a fat splitting ferment, lymphocytosis may be defined as an antagonistic reaction of the blood against antigens of a lipoid character. This is an interesting observation. He also considers the pharynx as a portal of entry of the leukemia infection and cites some work done on Vincent's angina in support of this. He concludes with the statement that, given a condition of thymolymphatic state and an acute infection superimposed, it results in a stimulation and over-production of lymphatic tissue. Ward⁷ says that the theory of infection derives its support from the acute cases and reviews the histories of several hundreds of cases. He records 6 cases of congenital leukemia, giving references, similar to clinical cases as seen. There was no evidence of the mothers being leukemic, the duration of life being from still-birth to one month. He states that there is no evidence of lymphatic leukemic mothers having leukemic infants and no evidence of leukemic infants having leukemic mothers. He says there has been no evidence of the disease being infective, although he cites a number of cases with apparently such a condition. He concludes his article by comparing the disease to metastatic or malignant disease, except that there is no cellular reaction to the leukemic growth nor any destruction of adjoining tissue except by pressure.

Ryan⁸ reports a case complicating pulmonary tuberculosis, concluding with the statement that the pulmonary tuberculosis was the initial disease and that 2 years later she developed the leukemia, of which she died.

Associated Enlarged Thymus. This condition is mentioned by several observers. Among whom Major⁹ reports a case where the thymus was 10x7x7 cm., and reports several other observers. As to children, he says: "We seem to have no definite criteria by which to judge which is primary, the thymus or the blood disease. Moreover the relationship between lymphosarcoma and

lymphatic leukemia is so close as to suggest that in some cases they are merely different manifestations of the same disease". In another case: "The suggestion is strong that the enlarged thymus was an indication of an abnormal lymphatic state predisposing to disease of the lymphatic apparatus which later manifested itself by the appearance of an acute lymphatic leukemia." Rappaport¹⁰ reports a case with the thymus 18x12x9 centimeters, in an adult.

Blood Chemistry and Metabolism. Very little has been done on this. Means & Aub¹¹, quoting Magnus-Levy and Edsall's cases, state that there was a negative nitrogen balance, and marked output of uric acid. Quoting Folin and Denis, the blood uric acid was markedly increased. There was a retention of the phosphates due to rapid building lymphatic tissues which is especially rich in phosphates. After radiation with x-ray, there is an increase in uric acid and purin bases and a decrease in leucocytes and a rise in total urine nitrogen. They quote observations of the x-ray on normal tissues, in which the white cells have a nuclear fragmentation, then lysis of the entire cell. The metabolism of leukemic blood is more active than normal blood. The nitrogen balance is usually negative in acute leukemia. Endogenous uric acid elimination and uric acid content of the blood is increased (nuclear destruction of blood cells).

Blood Counts. When attempt is made to spread the blood drop in a film, due to the excessive masses of leucocytes, the film is thick and viscous (observation of Cabot and self). The highest white counts we find record of were reported by Cabot where one case had 1,505,000, and another, just before death, 1,631,000. Peutz¹² reports a case of 720,000 leucocytes. In this case the child had a fall 2 weeks before any symptoms, and the shock from this, superimposed on a status lymphaticus (as the child was always pale from birth), may have caused the lymphatic leukemia.

Prognosis. The older the person the better the prognosis. As a rule no case recovers. The duration may be from a few days to 6 months for acute cases, the average being about 3 months. The x-rays and benzol seem to prolong life and in some cases, particularly older individuals, seem to cure. But remissions do occur. The prognosis is especially bad in children under

10 years. Marked and increased anemia of the aplastic type is a constant finding in fatal cases.

Treatment. X-rays, softened according to the age of the patient, and fairly long exposure twice weekly, or every day with shorter exposures, or stronger rays at longer intervals, all have their advocates. Warthin¹³ divides the action of the rays into 2 types: 1st, immediate action, degenerative; and 2nd, reactive changes. As to the minute changes produced in lymph tissues by exposure to the rays, he concludes: "Prolonged irradiation of the hemopoietic organs in leukemia first causes a degeneration of the young and maternal cells, leading to a great decrease of leukocytes. After these destructive effects there follows a reaction in which cells of a more resistant type are formed, and the essential leukemic process remains unchecked, although altered in character."

Benzol benzene acts on the leukopoietic apparatus of the body, "expends its activity primarily on that portion of the bone marrow which is concerned in the production of the granular leucocytes, leaving unaffected the tissue which manufacture non-granular lymphocytes and erythrocytes. But benzol causes inhibition and then hypoplasia so that we quickly get a reduction in the granular white cells and a gradual increase in the red blood cells."¹⁴ Benzyl-benzoate, 20 per cent. alcoholic solution, dose, adults 10 drops in water after meals, has been used successfully in one case reported by Haughwout and Asuzano.¹⁵

CASE REPORT. S. B. Complaint: noticed swelling of the glands in his neck. His appetite fair, sleep restless; bowels in good shape.

Born December 12, 1915, first pregnancy; in labor 18 hours, normal, vertex presentation. Weight $9\frac{1}{4}$ pounds. Required spanking to resuscitate, but mother had chloroform as anesthetic so does not recall details. Was put to breast and received plenty of milk at end of third day. Breast fed 13 months but at irregular intervals; then fed cow's milk, cereals, toast, poached egg, but never a hearty eater. Held up head at 3 months, and sat up at 5 months, was a strong baby, walked at 14 months. Started talking at 2 years. Had measles at 3 years, "hives" at 2 years, and off and on since with no assignable cause. Would have fever on slight provocation but cleared up on good dose of castor oil.

No other illnesses. On September 7, 1919, there was noticed a swelling of neck, slight on left, but marked on right. Was examined by Dr. D. J. Beatty about October 1. He found enormously hypertrophied tonsils, and removed the same on October 3, with normal post-operative convalescence.

Family History. Mother had no illness except childhood diseases and during the pregnancy of this child never felt better. Father always well. No history of similar trouble on either side of family. Maternal parents living and well except grandmother who is asthmatic. Paternal mother well and strong; paternal father died suddenly after $\frac{1}{2}$ hour illness.

Examination. Weight, $37\frac{1}{2}$ pounds. 4 P. M. temperature, 101.6° . Lower border of spleen in the nipple line, $11\frac{1}{2}$ centimeters below border of the ribs, or 2 centimeters below the navel and 2 centimeters to the left of the navel.

On inspection, child's complexion is normal, clear, with marked prominence of the posterior and anterior cervical glands, some enlargement of the sub-maxillary, some enlargement of the pre- and post-auricular on both sides, size of a large pea, while the cervical glands are 3 or more centimeters in diameter. Axillary glands are the size of peanut kernel to almost an almond, visible upon marked extension of arms. In the groin, several glands varying in size from a kernel of rice to a navy bean, 6 to 10 in number, are felt on either side. Testicles are both descended, liver is enlarged 4 centimeters below the lower costal margin.

Heart dullness $4\frac{3}{10}$ centimeters to the right of the median line and $9\frac{1}{2}$ centimeters to the left. At the base of the heart the area of dullness extends 4 centimeters to the right below the right clavicle, and 4 centimeters to the left below the clavicle. On auscultation, heart tones clear at the apex, at the base pulmonic second clear, aortic second not distinctly marked but a swirling musical note transmitted along the right subclavian. Right auricular ventricular clear cut. Posteriorly dullness extends down to within 2 centimeters of the angle of the scapula, laterally 5 centimeters to the left above, and $4\frac{1}{2}$ to the left below, 5 to the right above, and $4\frac{1}{2}$ to the right below.

Skin is fairly well nourished, no enlargement of the epitrochlear glands; knee reflexes slightly sluggish; plantar reflexes normal, no Kernig, no Babinski.

Urine examination specimen was negative.

Blood examination made October 29, 1919: Reds, 3,888,000; whites, 43,000; polymorphonuclears, 5; small mononuclears, 92; large mononuclears, 5; eosinophiles, 1%; myelocytes, 1%; hemoglobin, 82%; nucleated reds and degenerated whites present in the stained specimen.

Von Pirquet, negative.

Stool examination: November 17, 1919—Normal stool.

November 14, 1919; Whites, 243,000. Differential shows 97% lymphocytes.

November 17, 1919: Benzol, grs. 192; Calc. lactate, IV drams; Syr. Tolu, VI ounces.

November 17, 1919, showed spleen had diminished so it was about 1 centimeter above the navel line. The glands of the neck, particularly on the right side, which had been so markedly enlarged were diminished to very small pea size, but there was some development of the sub-maxillary glands. The temperature was 102.6°. He has now had 5 treatments with the x-ray and averaged 2 drops 3 times a day of the benzol. His appetite is poor, but the breathing which, prior to the treatment of the x-ray, had been very dyspneic, probably from pressure of the enlarged thymus on the trachea, was a great deal better, and the child was resting at night. He has days when he feels good and other days when he feels very wretched and seems to have fever.

December 4, 1919: Died this A. M. under Christian Science. Mother states that prior to death all swelling of neck had subsided, that he looked quite natural again. Had some profuse gastric hemorrhages from which he died.

Dr. Arthur Grover reports: "The tonsils and adenoids that were submitted for examination show as follows: Grossly there is marked hypertrophy in both. Microscopically the hypertrophy is seen to be due to a hyperplasia of the lymphoid elements. That is to say, the germinal centers are markedly obliterated by the immense collections of lymphocytes. Very few polymorphonuclear leucocytes can be seen so there is no acute inflammatory reaction. The number of endothelial leucocytes appears to be normal. There are no eosinophiles or plasma cells to be noted. There is some increase of fibroblasts. There is no evidence of malignancy nor any evidence of tuberculosis. The whole ap-

pearance of the section is entirely compatible with lymphatic leukemia."

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THE FOOT PHENOMENON IN MENINGITIS (*Revista di Clinica Pediatrica*, Dec. 1919). A. Nizzoli cites conflicting evidence from various writers on the constancy and significance of the various signs of meningitis in children, of which he enumerates a long list. The excitability of the nervous system in children causes a host of symptoms which obscure the diagnosis. The signs which depend on reflex action are the most instructive in children, as they cannot fight against them. In two cases of tuberculous meningitis he noted dorsal flexion of the big toe and a fanlike spreading of the other toes when he tried to induce the identical contralateral reflex. The other leg became spontaneously flexed, and the toes assumed the position mentioned above. The reflex is induced on the recumbent child, with legs extended, by flexing one on the thigh and on the pelvis, with moderate compression, watching the behavior of the other leg. This foot phenomenon could never be elicited in healthy children, but could be induced at will in both these meningitic children. In others with the disease more advanced the response was negative, confirming that the phenomenon is an earlier sign.—*Journal A. M. A.*

CLINICAL DEPARTMENT

PATIENTS SELECTED FROM OFFICE CLIENTELE OF CHARLES G.
KERLEY AND EDWARD J. LORENZE, JR.

New York.

CASE NO. 1. Female, age 10 weeks, weight 9 pounds, 1 ounce.

Complaint. Baby very hungry, vomiting a large part of each feeding, having 4 or 5 loose green stools daily, failure to gain in weight, cries a great deal. Mother thinks child should have more food.

Family History. Mother is 31 years old, father 41. Both parents are well.

Personal History. First child, full term, forceps delivery, weighing at birth $7\frac{1}{2}$ pounds. Infant was breast fed entirely for 2 months. At present there are 5 bottle feedings of 4 ounces each, of the following formula: 4 oz. whole milk, grade A; 6 oz. water; $1\frac{1}{2}$ oz. Dextri-Maltose No. 1, and 2 breast feedings, both breasts being used at each nursing. In case the breast feedings had not been sufficient a supplementary bottle feeding had been given.

The condition of the child had been satisfactory and he had gained in weight until the eighth week when there began to be an insufficiency of mother's milk. Since that time there had been no gain and the vomiting had been very persistent.

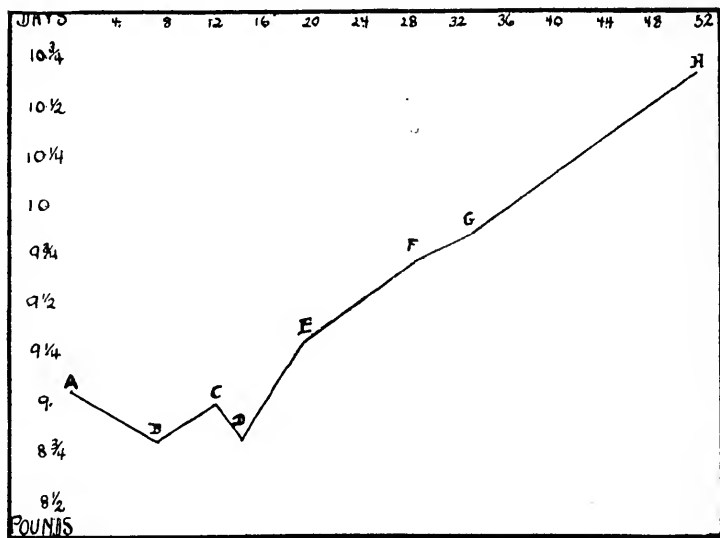
Inspection. Child appears bright, active and is fairly-well developed. The skin is clear but rather pale. Eyes, nose and mucous membranes apparently normal.

Physical Examination. Fontanel one inch by one inch, sutures closed. No enlargement of the epiphyses, no beading of the ribs, muscles soft and flabby, heart, lungs, liver and spleen negative. There were no glandular enlargements. Urine and blood examinations were not made. Mouth and throat were normal. The abdomen was negative. A pyloric tumor could not be found.

Management. The following formula to be prepared at home was advised: 8 oz. top 15 of 1 bottle of certified milk; 13 oz. water; 2 oz. lime water; 1 oz. Imperial Granum; 1 oz. milk sugar.

This was cooked in a double boiler for 30 minutes, the lime water and sugar being added at the completion of cooking. She was given $4\frac{1}{2}$ ounces, 5 feedings daily together with 2 breast

feedings, 7 feedings in 24 hours, at 6-9-12-3-6-10-2. Atropine 1/1000 of a grain was given in a teaspoon of water 10 minutes before each feeding. She was weighed before and after nursing to make sure that at least 4½ ounces was taken. At the end of the first week there was a loss of 4 ounces. The nourishment, breast and bottle, was taken eagerly, the vomiting continuing as before. She was now given a formula prepared by the Walker Gordon Laboratory of: 1.50% fat; 1.50% protein; 6% milk sugar; 2% starch; 6% lime water.



CASE No. 1—WEIGHT CHART.

- A. Top 15 oz. formula, 4 oz.—7 feedings; B. Evaporated milk formula—prepared by Walker Gordon Laboratory, atropine used; C. Evaporated milk formula. Fat and sugar reduced. Protein increased—3% barley added; D. Whole milk formula—with 6 tablespoonful farina. Atropine stopped; E. Same formula with addition of Dextri-Maltose. 5 oz.—6 feedings; F. Quantity of milk increased; G. Quantity of milk increased; H. Quantity of milk increased.

In 38 days there was a gain of 30 ounces.

Nursing proved to be a failure and was discontinued. The atropine was continued. In the preparation of this formula evaporated milk was used. After 3 days with continuation of the vomiting the formula was changed, sugar and fat reduced, protein and lime increased as follows: 1% fat; 2% protein; 3% starch; 8% lime water; 3% cane sugar.

As above, 4½ ounces was given at 3 hour intervals, 7 feedings daily. On this combination the vomiting ceased largely and there was a gain of 3 ounces in one week. During the following 3 days

there was a loss of 3 ounces, with the vomiting worse than at any time. There was no retention after 3 hours at any time—several tests were made. A pyloric tumor could not be felt and there was no visible stomach wave. She now vomited both during and after feedings. The stools were scanty but normal, weight 8 pounds, 13 ounces.

After 18 days of ineffectual attempts to control the vomiting, we gave the patient the benefit of thick gruel feeding. Not having had a brilliant success with the use of barley for this purpose we applied the suggestion of Dr. H. R. Mixsell (ARCHIVES OF PEDIATRICS, Aug., 1920), and used farina as indicated in the formula: 12 oz. whole milk; 18 oz. water; 1 tablespoonful cane sugar; 6 tablespoonfuls farina.

4½ ounces were to be spoon fed at 3 hour intervals. Atropine was now eliminated as it seemed to be of no value in the dosage given. In 5 days on this mixture there was a gain of 7 ounces, *with no vomiting*. Stools were normal and sleep was natural and child was happy. During the following 7 days there was a gain of 7 ounces and the vomiting ceased entirely. At this time the formula was increased to: 15 oz. milk; 20 oz. water; 1 tablespoonful cane sugar; 1 tablespoonful Dextri-Maltose; 6 tablespoonfuls farina. 5 ounces were given at 3 hour intervals, 7 feedings in 24 hours.

In preparing the thick formula the farina was added to 20 ounces of water. This was brought to a boil and then allowed to simmer for 2 hours in a double boiler. Milk was then added and the mixture was cooked 30 minutes. While hot, the cane sugar and the Dextri-Maltose were added. On October 29, 1920, 36 days after the beginning of the thick gruel feeding, the child had gained 30 ounces. Her physical condition was very satisfactory, stools were normal, she slept well and cried very infrequently. There had been no further vomiting.

CASE NO. 2. Male: 4½ years old. Weight, 38½ pounds. Height, 40½ inches.

Complaint. Habitual constipation, poor appetite.

Family History. Entirely negative.

Personal History. First child, full term, forceps delivery, birth weight 7 pounds. No noteworthy illness, occasionally mild bronchitis. Since birth there has always been obstinate constipation. Upon further questioning, the mother maintained that this

statement was absolutely correct, that the child's bowels had never moved without medication, enemata or suppository since birth. She was very much discouraged and felt that all treatment would be useless and came only because of the insistence of her family physician.

Inspection. A pale but fairly well nourished child showing fair muscular development. There was moderate drop shoulder, slight tendency to knock-knee and defective arches. Eyes, nose and lips appeared normal. Skin clear, abdomen distended.

Physical Examination. No bony changes, muscles rather soft, teeth normal, tonsils slightly enlarged and cryptic, heart, lungs and all other organs were negative. Mouth and throat were normal.

Blood Examination. Hemoglobin 78%, red blood cells, 4,800,000.

X-ray Report, Dr. L. T. LeWald: 15 minutes after the opaque meal the stomach is slightly dilated. The greater curvature is just above the level of the umbilicus. After 24 hours there is a considerable portion of the meal remaining as far back as the cecum. A portion of the meal has reached the sigmoid. At the end of 48 hours, the sigmoid is filled, showing definite evidence of dilatation and stasis.

Injection of Colon. There is most striking evidence of redundancy of the sigmoid flexure. There are 3 definite loops, one of which extends for a distance of 3 inches above the level of the umbilicus in the vertical position. The loops appear to be movable. The cecum is dilated, together with the right half of the colon. The ileocecal valve appears to be competent. The cecum is ptosed, its lower line reaching to the level of the acetabulum.

Summary. Extreme redundancy of the pelvic colon associated with colonic stasis and secondary dilatation of the cecum and right half of the colon.

Management. We have found that a great deal may be accomplished in cases of constipation, due to mechanical agencies, by properly adjusted diet. It is not to be expected that such influences will be felt immediately. But when persistently carried out it is of invaluable assistance. As is our custom, the mother was given our "Constipation Menu," from which she was to select the child's food.

Menu:

7.30 A.M. Cornmeal, oatmeal, wheatina, hominy (all cooked 4 hours the day before in water) served with butter and sugar, maple syrup and butter or milk and sugar. Minced chicken, bacon, soft boiled, scrambled or poached eggs.

A drink of milk or malted milk, bread stuffs as below.



CASE No. 2.—Male, 6 years, elongated sigmoid. Persistent constipation. Never an evacuation without medication.

11 A.M. The juice of 2 oranges or 6 ounces of prune juice.

12.30 P.M. Baked or boiled halibut or cod fish, beef steak, lamb chop, roast beef, roast lamb, poultry.

Baked or mashed potatoes, spinach, asparagus, string beans, peas, squash, white turnip, carrots, celery, onions and cauliflower.

Desserts: Stewed apples, stewed prunes, stewed figs, baked apple, bread, tapioca or gelatine pudding, all stewed or raw berries in season.

Bread stuffs. No milk at this meal.

4.00 P.M. Apple, pear, grapes or banana.

6.00 P.M. Chicken or mutton broth with rice jelly, farina or cream of wheat (cooked 2 hours in water) or one of the above cereals served as above. Cream cheese or honey on bread or crackers. Custard, corn starch, junket, stewed fruits may be given as a dessert when broth is given. A drink of milk or 4 ounces of milk, 4 ounces water and 1 teaspoonful of Phillip's cocoa and sugar to sweeten. Bread stuffs.

Bread stuffs. Wheatsworth Biscuits, whole wheat bread, rye bread and oatmeal crackers.

One-half glass of water 15 minutes before each meal.

Mix 1 tablespoonful of Kellogg's bran with cereal once or twice a day. Give plenty of green vegetables. Potato rarely.

We have learned that the habitual use of enemata is the worst measure to be used in cases of prolonged constipation. Drugs must always be used early in the treatment.

Thirty drops of fluid extract of aromatic cascara sagrada (Parke, Davis & Co.) were given 3 times a day. At the end of 2 weeks there had been no improvement in the boy's constipation and he lost $\frac{3}{4}$ of a pound in weight. The usual enemata was required daily. The diet was continued and he was given a capsule containing extract belladonna, $\frac{1}{8}$ grain; extract nux vomica, $\frac{1}{6}$ grain; extract cascara sagrada, $1\frac{1}{2}$ grains, 3 times a day. No effect was produced on the constipation during the next 2 weeks. Daily enemata were required. He lost further, now weighing 36 pounds, 12 ounces.

He was now given the advantage of daily abdominal massage, and 15 drops of fluid extract cascara sagrada aromatic, 3 times daily after meals. A satisfactory daily evacuation followed without enemata. This scheme of management was continued during the next 6 months, at the end of which time he weighed 41 pounds, 4 ounces, and showed satisfactory general improvement. The medication had been gradually diminished in dosage and discontinued after 9 weeks. Massage, having been carried out daily for the first 4 months, was later applied every

third day. The stools remained normal in the meantime. At the present time, one year since the last report and $2\frac{1}{2}$ years since first coming under observation, the weight is 52 pounds, height $44\frac{7}{8}$ inches. The child is well in all respects. The tendency to constipation still exists, however, and the diet as outlined must be carefully followed, but massage, enemata and drugs are not necessary.

Remarks. It has been found by Le Wald, through fluoroscopic examination, that intestinal peristalsis is defective in many patients with an elongated sigmoid and in other abnormalities of the large intestine. It is our effort, in the use of frequently repeated small doses of the cascara and in massage, to establish and maintain a better peristalsis. So called mechanical therapy is habitually neglected by the regular profession in many cases when it might be used with benefit. All of which accounts for the success in different types of cases, as in constipation, by so called irregular practitioners who resort to manipulative procedure. The ultimate outcome of those children with gross intestinal abnormalities is not particularly favorable, they probably will belong to that class of individuals who have to keep a proper intestinal elimination constantly in mind.

CASE NO. 3. Female; age $3\frac{1}{2}$ months, weight 12 pounds.

Family History. Negative. Father and mother are well.

Complaints. Originally the child came to us for advice regarding feeding. Later impetigo, purpura, hydrocephalus and staphylococcus aureus infection developed in the course of 11 weeks.

Personal History. First child, full term, forceps delivery, birth weight 6 pounds, 9 ounces. The child had pneumonia when 3 months old. She had been breast fed for 3 months, when weaning was necessary. For 2 weeks various feeding methods had been tried without finding one which was suitable.

Inspection. Fairly well nourished child with development corresponding to that of a child of her age. Expression was bright, skin was clear, abdomen slightly distended. Eyes, nose and lips appeared to be normal.

Physical Examination. Heart, lungs, liver and spleen were

normal. Muscles were rather soft and flabby. No rachitis. Fontanel one inch by one inch. Mouth and throat were normal.

Management and Further Personal History. The feeding history is unimportant. She was put on a milk and malt soup formula suitable for a child of her age, and gained 15 ounces in the next 10 days.

Impetigo. During this time an impetigo developed involving particularly the scalp, chest and legs. The disease responded to boracic acid baths and the application of an ointment of boracic acid and ichthyol, 10 per cent. of each being used.

Purpura. While recovering from the impetigo, which lasted 14 days, purpuric spots varying in size from $\frac{1}{8}$ to 1 inch in diameter appeared on the left knee, chest and arms.

Convulsion. One week after the appearance of the impetigo and 3 days following the first appearance of the purpuric spots, the child had a general convulsion. She was unconscious for one-half hour. At this time she came under the immediate care of one of us (Lorenze) at the home.

Hematoma. At the time of the convulsion a large hematoma 3 inches in diameter appeared on the side of the head immediately above the left ear. There had never been an elevation of temperature or prostration and food was taken very well. A digestive disturbance could not account for the convulsion.

Second Convulsion. Again 2 days after the first convulsion there followed another which lasted 1 hour. The child rested in a semi-comatose state for one-half hour following the convulsion.

Second Hematoma. Coincident with this convulsion, a second hematoma appeared which was smaller than the first and involved a considerable area about the left eye. There was no involvement of the mucous membrane and no blood in stools or urine.

Physical Examination. At this time, 7 days after the appearance of the purpura, a considerable change had taken place in the patient. The uninvolved portion of the skin had a blue greenish tint. There was now a general purpura with areas of hemorrhage varying in size from $\frac{1}{8}$ to 1 inch in diameter scattered over the legs, abdomen and chest. These, in addition to the hematoma above mentioned, comprised the skin lesion, the mucous membranes were very pale, there was internal strabismus,

the pupils reacted to both light and accommodation. The heart, lungs, liver and spleen were negative. The skin over the hematoma had now taken a black bluish color; from the nose there was a profuse mucopurulent discharge slightly tinged with blood. The cervical glands were not enlarged. There was no rigidity of the neck, Kernig and Babinski were not present. The mentality apparently was normal, the urine was negative.

Blood Examination. An examination of the blood by Dr. L. J. Unger was reported as follows:

Bleeding time, 8 minutes,
Coagulation time, capillary pipette method, $4\frac{1}{2}$ minutes,
Schick reaction, not done,
Capillary resistance test, positive,
Blood platelets, 120,000.

The above findings proved the existence of a purpuric condition. In addition the child had an intense secondary anemia.

Transfusion. Laboratory diagnosis and clinical findings were such that we considered transfusion imperative. The father was found to be a suitable donor. By Unger's direct method, 250 c.c. of the father's blood was transferred to the infant. Following the transfusion there was an immediate favorable response. A rosy pink color replaced the greenish tinge of the skin, the pulse was less rapid and the heart sounds became clearer. The purpuric areas rapidly disappeared so that at the fifth day there were but a few remaining.

Staphylococcus Infection. With the disappearance of the purpura there suddenly appeared a crop of pustules most abundant on the skin over the head and neck. The pustules rapidly developed into large abscesses. For 7 days the abscesses were treated by incision and other local measures. At this time, on the 22nd day of illness, Dr. L. E. Holt acquiesced at the suggestion of vaccine therapy. Autogenous vaccines were made by Dr. F. Sondern and 2 injections of 250,000,000 and 500,000,000 staphylococcus aureus bacilli were given at 48 hour intervals.

Acute Hydrocephalus. At the time of the consultation, Dr. L. E. Holt remarked at the size of the child's head, which then measured 17 inches in its largest circumference. In 2 weeks the head was again measured and found to have increased 1 inch in circumference, the fontanel was now bulging, which had not

been the case previously. During the next 6 weeks the head increased in size, measuring 19 inches and showed the typical picture of internal hydrocephalus. There was marked bulging of the fontanel and lateral strabismus. During the development of the hydrocephalus there had been decided improvement in the nutrition of the child, the weight had increased to 16 pounds, 4 ounces, a gain of 4 pounds and 4 ounces during a very stormy period in her career.

Dr. Alfred Taylor now saw the child in consultation and reported as follows: June 24, 1920: Puncture through the anterior fontanel drew a considerable quantity of fluid which was slightly blood stained, probably from the puncture, the flowing occurring when the needle was in about 2-2.5 cm. After a smaller amount had been evacuated an ampule of neutral phenolsulphonophthalein was injected and the needle was withdrawn. Lumbar puncture was then done, the needle was pushed in through the dura in 2 separate places, the 4th and 5th lumbar spaces, and no fluid whatever was withdrawn. These punctures were lateral punctures. A mid-line puncture was then done between lumbar 4 and 5 and when the needle entered the dura no spinal fluid came but there were a few drops of pure blood. This rendered the investigation useless from the standpoint of color effect, but the presence of the dry tap of the spine was definite indication of the case being one of obstructive hydrocephalus.

A catheter was passed into the bladder and left there to see how soon the phenolsulphonophthalein would appear in the urine. Phenolsulphonophthalein appeared in the urine first after 2½ hours. The parents were advised to have a puncture of the corpus callosum made.

June 25, 1920. Operation. An incision was made just to the right of the mid-line in the fontanel. When the dura was punctured there was an outflow of bloody cerebrospinal fluid, evidently having occurred through the puncture wound of yesterday, the brain cortex being very thin. The canula was passed down along the falx cerebri and was then passed through the corpus callosum into the third ventricle, from which a small amount of fluid was recovered. The hole through the corpus callosum was then slightly enlarged by manipulation of the canula. The wound was closed by layer sutures and the baby was returned in good condition, the operation having lasted about 20 minutes.

Post-Operative Course. The post-operative course was uneventful. The child was fussy for the first few days and did not take her feeding well. On June 29 the sutures were removed and there was good primary union. On June 30 she left the hospital with no other dressing except a layer of collodion over the wound, the head had been shaved all over and when she left the hospital measured $19\frac{1}{2}$ inches in circumference. The eyes showed rather less tendency to squint and were more freely movable. The child was playing with her feet much of the time and seemed to be quite happy and was much less troublesome and worried. She was now taking her food well.

In this case, from the failure to get spinal fluid from the spinal canal and the failure of the phenolsulphonephthalein to appear in the urine for $2\frac{1}{2}$ hours, it was evident that the blocking had occurred so that the spinal fluid could not escape from the ventricles. Blocking occurred either in the Aqueduct of Sylvius or at the outlets of the fourth ventricle.

The fact that the neutral phenolsulphonephthalein did not appear in the urine until $2\frac{1}{2}$ hours after injecting, showed that the rate of absorption was very materially delayed. The intention was to make artificial communication between the ventricular system and the surfaces of the hemispheres so as to open up the entire absorbing field. This was done by means of puncture through the corpus callosum into the third ventricle. This permitted the ventricular fluid to come up between the hemispheres and to spread out upon their convex surfaces which form the major part of the area which absorbs the cerebrospinal fluid normally.

On October 18, 1920, at the age of $10\frac{1}{2}$ months, our findings are as follows: General condition, excellent. Weight, 21 pounds. Head $19\frac{1}{2}$ inches in circumference. Eyes are normal. She has 7 teeth. The skin and all the organs are normal. She creeps and tries to stand. Muscles are firm and color good, recognizes her parents and apparently is a perfectly normal child. The head has not increased in size since June 24, an interval of over 4 months.

Remarks. It is our belief that the convulsions indicate the beginning of the hydrocephalus. The enlargement of the child's head was noted about 10 days after the first convulsion.

CONTRIBUTED BY PHILIP S. POTTER, M.D., AND A. CLEMENT
SILVERMAN, M.D.,

Syracuse, N. Y.

HOSPITAL CASE No. 48326.* V.M.E., female infant, admitted to Hospital of the Good Shepherd, May 17, 1920.

Family History. Father, 21; mother, 17. Both in good health. Wassermann on mother negative. Paternal and maternal grandparents alive and well. No history of any chronic diseases in either family.

Past History. Born March 30, 1920; first, illegitimate, full term, normal delivery. Said to have weighed 6 pounds and 3 ounces at birth. Not breast fed at all. Was started on a simple milk dilution and about 10 days after birth was placed in a private maternity and infants' home. Baby admitted to hospital from this institution.

Present Illness. Baby did not gain on its feedings and soon began to appear undernourished. Early in May, it is said, both hands and feet began to look blue and felt cold, and the baby appeared to cry when these were handled. At first the extremities were pale and the blueness would pass off after a while or change to a reddish discoloration, but for about a week before admission the extremities were almost constantly purplish.

A few days before admission the tip of the right ear turned black. At the same time the child began to take its feedings poorly. The child had no fever at any time. Its temperature appeared to be almost constantly subnormal.

Physical Examination. Fairly well developed but marantic female infant, looking pale and very feeble. Weight, 6 pounds, 2 ounces. Rectal temperature 96.8 degrees. Head negative. Pupils react to light; sclerae pearly blue and clear. Nose and throat negative. Heart and lungs negative. Abdomen soft. Liver edge palpable 1 cm. below costal margin; spleen not felt. Genitals negative. Extremities: both hands from wrists down and both feet below the ankles are cyanotic, purplish blue, cold. The anemic pressure trace disappears slowly. On the pad of the left great toe is a small black area about 3 mm. in diameter. The tip of the right ear shows a black area of 1 x 0.5 cm., surrounded by

*Case of Raynaud's Disease in an infant of six weeks, from the Pediatric Service, Hospital of the Good Shepherd, Syracuse University, Syracuse, N. Y.

a larger area of black-blue cyanosis. The tip of left ear is markedly cyanotic. Skin is otherwise pale, clear, somewhat bluish or rather ashen gray.

Laboratory Findings. Roentgenogram of chest negative. Blood Wassermann negative. Blood was obtained from the superior longitudinal sinus a few hours before death for the blood chemistry findings: blood sugar, 72 mgm. per 100 c.c.; non-protein nitrogen, 65.7 mgm. per 100 c.c. No urine was obtained for examination, but the appearance of the diapers was not suggestive of hemoglobinuria. Blood examination was not done until the infant was moribund, and at that time the red blood count was 5,250,000; white blood count 24,200; polymorphonuclears 53 per cent.; lymphocytes 42 per cent.; large mononuclears 5 per cent.

Course of Disease. The child began to look moribund shortly after admission despite efforts at treatment, and died on the third day. During this time the extremities remained purplish, changing at times to a slightly brighter or darker hue. Before death the skin in front of the right ear also became cyanotic.

Necropsy. Body length 48 cm., weight 2.5 kg. Mesenteric lymph nodes not enlarged. Heart weight 14 gms., right lung 19 gms., left lung 14 gms., spleen 9 gms., liver 30 gms., kidneys 18 gms. Blood fluid. No gross lesions were found aside from the gangrene. Microscopic sections of the tissues were examined especially for the blood vessels, and long strips from the dorsalis pedis artery and vein were carefully examined. The gross and microscopic appearance of the vessel walls was found normal.*

Comment. This case, though under observation for too short a time for any extended study, appears, nevertheless, worthy of record. The available literature would seem to indicate that this is the youngest case of Raynaud's disease on record. Beck¹ mentions a case reported by Reiss in 1902, in which symmetrical gangrene of the extremities occurred at 7 weeks, but that child recovered. Beck himself reports a case at 6 months with necropsy. In his case, however, the vessels of the extremities and of the other tissues showed sclerotic changes when examined microscopically. In our case no changes in the vessels were detected in gross or microscopic examinations; nor is there any history or

*We are indebted to Profs. Steensland and Weiskotten of the Department of Pathology for the examination of the sections.

1. Beck, Carl: Raynaudsche Krankheit beim Säugling, *Jahrb. f. Kinderheilk.* 72: 84, 1910.

postmortem changes suggestive of any infection.² One of us has recently seen gangrene of the nose develop 2 days after the onset of an apparently mild erysipelatous infection of the face in a premature infant 45 days old. In the case herewith reported, Raynaud's disease appears to be the only logical diagnosis. The question comes to mind: If anemia and diminution of blood volume are etiological factors in this disease, why is it not more often found associated with infantile atrophy?

2. Michael, May: Case of Purpura with Symmetrical Gangrene of the Fingers. *Am. Jour. Dis. Ch.* 20: 124, 1920.

BACTERIOLOGIC FINDINGS IN EPIDEMIC ENCEPHALITIS (*Riforma Medica*, Naples, Jan. 31, 1920). Maggiora and his co-workers report that they isolated from the blood in three cases of severe lethargic encephalitis a gram-positive diplococcus which reproduced in guinea-pigs a fatal disease with torpor, paresis and jerking of muscles, and punctiform hemorrhages in the gray matter of the brain. The diplococcus is a facultative anaerobe and passage through animals seemed to enhance its virulence. Boccocari and Panini report the finding of a gram-negative diplococcus in the blood of patients with lethargic encephalitis and from the blood from the heart in one fatal case. Guinea-pigs inoculated with it developed a diffuse diplococcemia.—*Journal A. M. A.*

ECZEMA IN INFANTS (*Archivos Españoles de Pediatría*, Madrid, Dec., 1919). E. de Oyarzabal remarks that as the skin is so sensitive in children with eczema, it may be advisable to refrain from washing the eczematous regions with soap and water, and use olive oil, cold cream, a benzoin or a hot 3 per cent. solution of boric acid. The region in children should be covered with a bandage to protect against scratching. If in the face, and if it itches much, it is better to give small doses of bromid or chloral to insure the child's sleeping. Eczema of the scalp, he says, readily improves under a 2 per cent. salicylated yellow petrolatum or oil containing 1 to 5 per cent. anthrasol, cleansing once a day with olive oil and occasionally washing with an infusion of chamomile. Eczema, rebellious to all other measures, may yield to roentgen-ray exposures. "With these, admirable results are obtained."—*Journal A. M. A.*

MISCELLANY

INTERESTING CASES*

SINUS-THROMBOSIS FOLLOWING MEASLES

J. W., male, aged 18 months, was admitted April 24, 1920. case showed coryza, conjunctivitis, marked photophobia, and a general maculo-papular rash. Temperature, 104°; pulse, 102; respirations, 36.

Rash was well marked on April 25, child doing nicely. At 8 p. m., on April 26, temperature was 104°; pulse, 160; respirations, 52. On morning of April 27, child had a frank bronchopneumonia, both bases. On April 28, temperature was 105.4°; pulse, 180; respirations, 58. Edema of the right ear, and over tip of mastoid, obliterating the posterior auricular folds, was observed. The left drum, which was bulging, was incised and pus obtained.

On May 5, left ear drum was again bulging, was opened and pus obtained. In the afternoon, there was bleeding from right ear, and this kept up for 3 days, until operation on May 9.

Child was operated on for right mastoiditis, on May 9. On opening, pus with a marked odor was discovered. There was a thrombosis of the right jugular vein, and about 5 inches of it was resected. Child died about one-half hour after the operation.

CHICKENPOX COMPLICATING SCARLET FEVER

E. S., male, aged 6½ years. This patient was admitted to Willard-Parker Hospital on May 1, 1920, with a diagnosis of scarlet fever. On admission, temperature was 101°; pulse, 130; respirations, 28. Fine, erythematous, punctate rash was general, and patient had a strawberry tongue. Before admission, on April 28, patient had had both tonsils removed; and, on admission, there was a marked exudate in both tonsillar spaces.

Temperature dropped to normal, and remained so until May 7, when it rose to 101°. On May 9, it went to 102.4°, and several vesicles appeared on face and neck of patient. He was then transferred to an observation room, with a tentative diagnosis of chickenpox. Within 24 hours, the vesicles had attained a size

*Recorded by Department of Health Hospitals, City of New York, in the Weekly Bulletin of the Department, November 20, 1920.

of about $\frac{1}{4}$ inch in diameter, and had become pustular, so that the probability of a general infection, with multiple abscesses, was considered.

On May 11, the temperature had begun to come down, and numerous new pustules appeared over patient's trunk and extremities. These pustules all began as vesicles, quickly becoming pustular. The skin surrounding the pustules was in all instances red, but not infiltrated or painful. Within 3 days the pustules on the face began to scab over, and disappeared without leaving a scar. New pustules kept coming until May 21, at which time the face had entirely cleared up and, a few days later, nothing but a few scabs were left of the entire eruption.

The absence of a septic curve in the temperature, the drying up of the pustules, and their healing without incision or scarring all pointed to the case as being one of varicella, superimposed on scarlet fever, although at the beginning of the eruption the question of pyemia was considered. Since this case, several more cases of varicella have been seen in scarlet fever patients, but none of them of the extent or severity of the one detailed.

MENINGISMUS FROM SEVERE THROAT INFECTION

L. H., female, aged 22 months, ill 2 days, was admitted on June 22, 1920, with a diagnosis of pharyngeal diphtheria. On admission, there was a profuse, slightly sanguineous nasal discharge. A dirty grayish, non-adherent exudate covered tonsils, pillars and margin of soft palate. There was moderate ulceration of the underlying tissues. The cervical glands were only slightly enlarged. The child appeared very toxic. A smear from the throat showed numerous cocci, but no fusiform bacilli or spirilla, and no diphtheria bacilli. The rectal temperature was 103°.

Although the process in the throat did not seem diphtheritic in character, 5,000 units of diphtheria antitoxin were injected, intravenously.

During the next day the temperature fell slightly, but there was no change in the general condition of the patient. Examination of the lungs and ears was negative. Leucocyte count was 14,000.

On the following day there was marked opisthotonus; the patellar reflexes were normal, and Kernig's sign was absent.

A lumbar puncture was done, and about 20 c.c of clear fluid

obtained, under slightly increased pressure. (Examination of fluid was negative.) The following day the neck was still rigid, and Kernig's sign positive. There were no pupillary changes.

For the next 5 days the patient ran a temperature varying between 100° and 105°, which, from that period on, fell steadily to normal. Meningismus lasted, in all, 4 days. The nasal discharge lasted about 2 weeks, the throat cleared up in about a week.

Repeated cultures from the nose for diphtheria bacilli were negative.

This is one of several cases of severe throat infections seen, where meningismus, to a greater or less degree, has been present. The spinal fluid has been uniformly clear, and under but slightly increased pressure. Cultures and smears for the diphtheria bacillus, and for Vincent's angina, negative.

PHYSICAL SIGNS OF FOREIGN BODIES IN BRONCHI (American Journal of Medical Sciences, March, 1920). Decreased expansion on the affected side, the presence of very fine râles and the "asthmatoïd wheeze," T. McCrae regards as signs of value in the diagnosis of foreign body in a bronchus. Some foreign bodies, such as a peanut, set up a very acute general process which is fairly distinctive. Other structures, such as metallic objects, cause permanent changes, usually in a lower lobe. The chief errors in diagnosis are to mistake the signs for those of pneumonia in the early stages and in the acute cases, and for tuberculosis after the body has been present for some time.—*Journal A. M. A.*

SUBARACHNOID MENINGEAL HEMORRHAGE (Journal de Médecine de Bordeaux, March 10, 1920). In one of three cases described by P. Mauriac and E. Ferré—all in young men—no cause for the sudden meningeal hemorrhage could be discovered, and after blood had been released by lumbar puncture, recovery was complete in two weeks. In the second case the hemorrhage followed the pulling of several teeth. The third case was diagnosed as uremia with convulsions, as the urine contained albumin. But lumbar puncture revealed the hemorrhage. Complete recovery followed in each case. The writers warn that too much fluid must not be released at one time by lumbar puncture, or the hemorrhage may be started anew.—*Journal A. M. A.*

DEPARTMENT OF ABSTRACTS

ROSS, FRED E.: ACUTE GENERAL PERITONITIS IN INFANTS. (The Pennsylvania Medical Journal, March 20, 1920, p. 323.)

When acute pyogenic infections of the new born occur, peritonitis is perhaps the most common lesion found at necropsy. It is due to a direct infection through the umbilical wound and is accompanied by an umbilical arteritis and often with erysipelas. After the neonatal period and before the fifth year, peritonitis is a very rare disease. After the fifth year, peritonitis is relatively more common. In infants, when the disease occurs, it is probably a local manifestation of a general septicemia. The author states that there is one symptom, which is absolutely characteristic and diagnostic, namely, distention of the abdomen with marked general abdominal tenderness. Four cases are reported varying in age from four weeks to four months. All had some elevation of temperature, high at the onset. Neither diarrhea nor constipation were prominent features; one had persistent vomiting and in another cyanosis was present. Common to all was marked distention of the abdomen with general abdominal tenderness.

L. L. SHAPIRO.

HILL, LEWIS WEBB: A CRITICAL DISCUSSION OF CERTAIN PHASES IN THE DEVELOPMENT OF MODERN INFANT FEEDING: THEIR INFLUENCE UPON PRESENT TEACHINGS. (The Boston Medical and Surgical Journal, March 25, 1920, p. 311.)

To Biedert we owe the first really important scientific investigations in infant feeding, and the proving that human milk and cow's milk are very dissimilar in composition, especially as regards their casein content. To Meigs we owe a more accurate analysis of human milk, and the widespread diffusion of his own and of Biedert's ideas in America. To Rotch we owe the great principles of individualization, and the new conception that it is not the food as a whole, but its elements that must be considered. These three men may be regarded as the great pioneers of infant feeding especially on the study of what to feed the baby. To Widerhofer we owe the first pathological classification of gastrointestinal diseases in infants. It was Escherich who

first studied the bacteriology of the infant's intestine, and showed that bacterial processes in the intestine, and their relationship to the food supply can never be separated from questions of practical infant feeding, either normal or abnormal. To Czerny we owe the first really adequate study of the "nutritional disturbances," and their most comprehensive classification. Finkelstein's teachings, which are the most popular to-day, came into prominence about 1907. His chief contributions may be summed up in four phrases: sugar, salts, clinical classification and protein milk. These four men studied the baby primarily and his food secondarily, contributing especially the study of physiological, bacterial and chemical processes within the baby's body. Referring to the subject as the "tools of the trade," Dr. Hill urges that we know our food elements, and be able to trace them in their progress through the digestive tract, and that we have several methods of milk modification at our command so that they may be combined and modified to meet special indications.

L. L. SHAPIRO.

EPSTEIN, J. W.: INTUSSUSCEPTION IN INFANTS WITH A REPORT OF FIVE CASES. (*Ohio State Medical Journal*, June 1, 1920, p. 429.)

Four of the cases reported occurred during the summer months when every physician is called to treat children for various gastric disorders. The season of the year and the acute onset resembling that of gastrointestinal disorders are prone to distract the physician's mind from the possibility of an intussusception. In all the author's cases, the alarming symptoms that induced the mother to seek medical advice was the hemorrhage from the rectum, a symptom of sufficiently grave importance to warrant the elimination of a possible intussusception. The differential diagnosis from a follicular enteritis, the only form of gastroenteritis where blood is present in the stools, should present no difficulty. The presence of shock, a normal or subnormal temperature, absence of stools, a palpable tumor, and a mass on rectal examination will establish the diagnosis of intussusception with certainty, while in follicular enteritis the blood is scarce, there is no shock, no tumor mass palpable, high fever is present and the stools on microscopic examination reveal the presence of pus cells. It would seem that in every case with a history of

blood in the stools, a rectal examination should be made for the purpose of either establishing or eliminating a diagnosis of intussusception, and further, it would seem necessary that the napkin should be examined by the physician to determine whether there are stools present with blood or pure blood only. The statement of the mother is not always reliable. L. L. SHAPIRO.

STERN, ARTHUR: THE UMBILICAL COLIC OF FRIEDJUNG IN OLDER CHILDREN. (*Journal of the Medical Society of New Jersey*, XVII, No. 8, August, 1920, p. 279.)

Stern calls attention to a typical form of hysteria in children from 3 to 10 years, described by Friedjung in 1904, and characterized by sudden attacks of abdominal pain in the region of the umbilicus. The attacks of pain are usually sudden in onset and last only from 15 to 30 minutes; they occur at irregular intervals, occasionally through a period of years, and are usually without other gastrointestinal disturbances such as vomiting and diarrhea. Psychopathological signs, such as nail-biting, may be present, and all cases show a hyperesthesia, especially of the cervical and thoracic vertebrae, and of the skin of the abdomen. The differential diagnosis from such conditions as acute appendicitis must, of course, be made most carefully. Stern considers the disease undoubtedly a disturbance of the nervous system, and one probably to be classified among the hysterical group.

PHILIP MOEN STIMSON.

HAND, ALFRED: THE DIAGNOSIS OF EMPYEMA IN CHILDREN. (*Pennsylvania Medical Journal*, XXII, No. 12, September, 1920, p. 697.)

Hand, in this speech before the Pediatric Section of the Medical Society of the State of Pennsylvania, noted the rarity of empyema in infants under a year old and also in the colored race, both being in contrast to the frequency with which the disease may follow any variety of pneumonia in other children. He described the usual clinical picture of empyema in children, but noted that there was no one pathognomonic sign. He called attention, however, to the differences in the physics of the child's chest as compared with that of the adult, viz., the greater resiliency of the walls, the greater mobility of the heart, and the

greater ease which the vocal and respiratory sounds may be transmitted through effusions. In cases of indefinite clinical signs and where the x-ray failed to give conclusive evidence, such as when the pneumonic consolidation was still present, he advocated aspiration, and his site of choice for the puncture, he said, was the sixth interspace in the midaxillary line, preferably with the help of general anesthesia, in turn exploring inwards, backwards, and forwards, with only one insertion of the needle through the chest wall.

PHILIP MOEN STIMSON.

MORSE, JOHN LOVETT: A STUDY OF THE RELATIONSHIP OF CONVULSIONS IN INFANCY AND CHILDHOOD TO EPILEPSY. (*American Journal of Diseases of Children*, August, 1919, p. 73.)

Morse recalls in his article the discussion of 20 or 25 years ago as to the connection between convulsions in early life and epilepsy. Since that time he has followed the condition of babies and children he has seen with convulsions in consultation and private practice. He includes only those cases in which the convulsions were the primary cause for medical attendance and not those in which there were any evidences of acute or chronic cerebral disease. He wished to determine in the first place, what proportion of the children, otherwise apparently normal, having convulsions have epilepsy or develop it later, and second, to find out, if possible, whether there is anything in the history or in the manner of the development of the convulsions to show whether or not they are manifestations of epilepsy, or whether they will be followed by or develop into epilepsy later. He obtained satisfactory reports regarding 107 children. The time elapsed varied between 2 and 20 years. In order to study these cases better and to avoid confusion they were divided into 4 classes (1) those in which the convulsions were associated with evidences of spasmodophilia, (2) those in which the convulsions occurred in the course of whooping-cough, (3) those in which there was a single convulsion or a series of convulsions at the onset of some acute disease or with an attack of acute indigestion, (4) those in which there had been repeated convulsions during a considerable period or in which there had been repeated attacks suggesting petit mal. The results of this study were very unsatisfactory and very few conclusions could be drawn from it. His conclusions are as follows: Convulsions which are a manifestation of spasmodophilia are

likely to eventuate in epilepsy. Convulsions which occur in the course of whooping-cough must always be regarded seriously, as they are quite likely to be followed by epilepsy later. Single convulsions or a series of convulsions occurring at the onset of an acute disease or with an attack of acute indigestion are less likely to be followed by epilepsy than are repeated convulsions during a considerable period or repeated attacks suggesting petit mal. Repeated attacks which would be classified as petit mal, or which suggested it, are just as likely to eventuate in epilepsy as repeated attacks of general convulsions. Nothing can be told from the nature of the early attacks as to the nature of the attacks when epilepsy develops later. When an injury to the head has directly preceded the onset of the attacks or there is no apparent cause for the attacks, epilepsy is more probable than when there is an apparent cause, such as indigestion, for each attack. The presence of an apparent cause for the attack does not, however, exclude epilepsy. The longer the attacks have persisted, the more probable is the diagnosis of epilepsy. General impressions, which cannot be explained, have a certain value in diagnosis. Finally and most positively, there is no way to determine immediately when a baby or child has a convulsion, or has had repeated convulsions or repeated attacks suggesting petit mal, whether it has epilepsy or whether it will develop later. C. A. LANG.

RODDA, F. C.: THE COAGULATION TIME OF BLOOD IN THE NEW-BORN. (*The Journal of the American Medical Association*, August 14, 1920, p. 452.)

By a short review of the literature, Rodda shows that the most frequent cause of death in the new-born is cerebral hemorrhage. He gives short histories of 4 cases with the necropsy findings and concludes that there are other factors than instrumentation and trauma concerned in cerebral hemorrhage. He summarizes as follows: 1. Cerebral hemorrhage is a frequent occurrence in the new-born, and the most frequent cause of death in the first days of life. 2. Cerebral hemorrhage is not always caused by obstetric operations; it may follow normal labors when least expected. 3. Severe trauma results in massive hemorrhages and early death. 4. A more frequent cause of cerebral hemorrhage is mild trauma plus hemorrhagic disease of the new-born, accompanied by findings of delayed coagulation

time and prolonged bleeding time. 5. A delayed coagulation time and prolonged bleeding time can be controlled by the subcutaneous injection of whole blood. This is a rational therapy in cerebral hemorrhage. 6. In severe cases, surgery should be employed early; operation should be controlled by blood studies and the injection of blood, if indicated. 7. The coagulation time and bleeding time should be determined in every new-born presenting unusual symptoms, or better, as a matter of routine. If reactions are delayed, blood should be administered.

C. A. LANG.

CLENDENING, LOGAN: THE CAUSE OF ABSCESS OF THE LUNG AFTER TONSILLECTOMY. (*The Journal of the American Medical Association*, April 3, 1920, p. 941.)

The author gives a short review of the literature, cites 2 cases, and concludes as follows: 1. Lung abscess is at present a frequent sequel to tonsillectomy. 2. It occurs in all classes of cases—in private as well as in free services. 3. It is sometimes fatal, always serious and often very crippling. 4. It is due in some cases to inspiration of infected material. 5. Motor-driven anesthesia apparatus, by creating a positive pressure in the pharynx, may operate as a cause. At any rate, the danger is sufficiently great to justify the discontinuance of their employment until comparative data can be secured. 6. It is due in some instances to metastatic infection through the lymphatics. 7. Swabbing or tampering with the throat, after enucleation has been accomplished, is the cause of one group of cases.

C. A. LANG.

NEWTON, MCGUIRE: CHRONIC APPENDICITIS IN CHILDREN. (*Southern Medical Journal*, March, 1920, p. 166.)

Four cases are illustrated here in which after medical treatment the x-ray was resorted to in an attempt to diagnose appendicitis. In all these cases appendicitis was diagnosed which was proven by subsequent operation. These children made an uneventful recovery, their symptoms entirely clearing up. The first, a difficult feeding case, for 9 years suffered from an increasing tendency to headache and constipation. The second case suffered from frequent attacks of cyclic vomiting who, at 5

years, had her tonsils removed with no benefit and at 7 diagnosed appendicitis; operated upon and made an uneventful recovery. The next case for 5 years suffered from vomiting alternating with bronchial asthma; this case elicited tenderness on deep palpation at the umbilicus. The last case at 5 suffered from violent attacks of urticaria with no abdominal tenderness which also cleared up after operation. The author thus shows how prone we are in losing sight of the frequency with which chronic appendicitis occurs in the young and lays special stress on the aid of radiography.

A. BRET RATNER.

HALSTED, W. S.: THE UPTURNED EDGE OF THE LIVER OVER ACUTELY DISTENDED EMPYEMATOUS GALL-BLADDERS. A DIAGNOSTIC SIGN OF SOME VALUE. (Johns Hopkins Hospital Bulletin, January, 1920, p. 14.)

The author directs attention to this manifestation on account of its occasional value as a confirmatory diagnostic sign. It is better to feel for the edge of the liver in the flat rather than the everted position.

A. BRET RATNER.

MYERS, E. LEE: ADENOID DIPHTHERIA—REPORT OF A CASE. (The Journal of the Missouri State Medical Association, January, 1920, p. 20.)

Myers reports an unusual case of adenoid diphtheria in a girl 9 years old. When seen by the author the child had been sick 3 days and presented distinct pallor, great muscular weakness, listlessness, lustreless eyes, a temperature of 97.6°, very weak and compressible pulse of 160. The examination of the tonsils, larynx and nose was negative. Post-nasal examination of the nasopharynx showed the vault of the nasopharynx filled with a yellowish-white, thin membrane, apparently covering the adenoid growth, of immense proportions. The child was immediately given 10,000 units of diphtheria antitoxin. Twelve hours later a post-nasal examination showed the post-nasal space to be clear of any membrane, although the child had a temperature of 104°, and a pulse of 120. Unfortunately no cultures were taken at this time. The child had an uneventful convalescence, during which time the cultures from the nasopharynx were persistently

negative for Klebs-Loeffler bacilli. The author based his diagnosis on the clinical picture, and prompt recovery after diphtheria antitoxin.

WILLIAM LONDON.

REID, MONT R., AND MONTGOMERY, J. C.: ACUTE CHOLECYSTITIS IN CHILDREN AS A COMPLICATION OF TYPHOID FEVER. (Johns Hopkins Hospital Bulletin, January, 1920, p. 7.)

The authors have collected 18 cases of typhoid fever in children under the age of 15, who either died from, or were operated upon for, complications arising in the gall-bladder. In one case acute cholecystitis did not develop until 8 months after recovery from the disease. In all the other cases, the complications came on during the course of the disease. The good results in recent years are due mainly to the fact that the operations have been performed before rupture of the gall-bladder and partly also to better surgical treatment. Slight pain and tenderness in the region of the right rectus muscle are not so very unusual during the course of typhoid fever. The vast majority of these patients get well. The points to bear in mind are acute pain in the right side of the abdomen, large gall-bladder or signs of acute peritonitis. There is a rise in temperature and a leucocytosis that varies between 10,000 and 33,000. They believe the best treatment cholecystectomy and advise immediate surgical treatment, for in such cases rupture of the gall-bladder may occur and thus lessen many times the chance of recovery. A. BRET RATNER.

BROWN, ALAN, MACLACHLAN, IDA F., AND SIMPSON, ROY: THE EFFECT OF INTRAVENOUS INJECTIONS OF CALCIUM IN TETANY AND THE INFLUENCE OF COD LIVER OIL AND PHOSPHORUS IN THE RETENTION OF CALCIUM IN THE BLOOD. (American Journal of Diseases of Children, June, 1920, p. 413.)

The authors give a short résumé of the literature and the results of their observations conducted on 14 cases of frank tetany, all of which showed varying degrees of rickets. Their conclusions are as follows: 1. Constitutional reactions are produced following intravenous injection of calcium lactate in 1.25 gram doses. The degree of reaction varied from a slight drowsiness to almost complete collapse accompanied by dyspnea. The signs of reaction disappeared usually between 1 and 7 hours; the

more severe the reaction the longer it took the patient to recover. 2. Intravenous injection of calcium lactate in 1.25 gram doses produces a temporary absence of both electrical and mechanical signs of tetany, usually lasting from 7 to 10 hours. 3. Calcium lactate, injected intravenously, apparently exerts no beneficial therapeutic effect unless supplemented by the administration of cod liver oil and phosphorus, and in this instance the reduction of the tetanoid symptoms is a little more rapid than with the employment of cod liver oil and phosphorus alone. 4. Cod liver oil and phosphorus produce an increase in the blood calcium with a corresponding reduction in the mechanical and electrical signs, within a period of from 10 to 17 days. C. A. LANG.

MATTILL, P. M., MAYER, K. M., AND SAUER, L. W.: DEXTROSE TOLERANCE IN ATROPHIC INFANTS. (*American Journal of Diseases of Children*, January, 1920, p. 42.)

Mattill, Mayer and Sauer recall to our minds the fact that by the Woodyatt method it has been shown that the tolerance of adults is from 0.8 to 0.9 gm. per kilogram per hour. In the present study they describe the apparatus and technique and gave dextrose solution intravenously to 4 nonatrophic infants. These infants ranged in age from 5 to 15 months and were more nearly normal than any of the others. In these cases, the tolerance was found to be 0.8 to 0.9 gm. per kilogram of body weight per hour. Seven atrophic infants were studied and showed emaciation, tendency to subnormal temperature, lack of turgor and grayish color of the skin. Their weights were stationary or nearly so; the stools were good. In no case was the tolerance below 1.4 or 1.5 gm. per kilogram of body weight per hour. Other authors found that the metabolism of the atrophic infant proceeded at a higher level than that of the normal infant. Observations of McClure and Sauer have shown that atrophic infants have a higher surface temperature than normal infants and that there is an increased insensible perspiration. An increased sugar tolerance would seem to fit in very well with such observations. In cases in which the injections were repeated a number of times, it was found that the sugar tolerance was quite constant. C. A. LANG.



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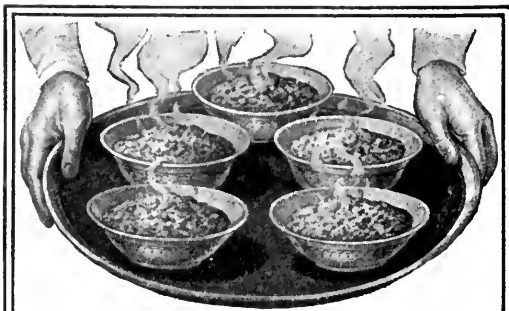
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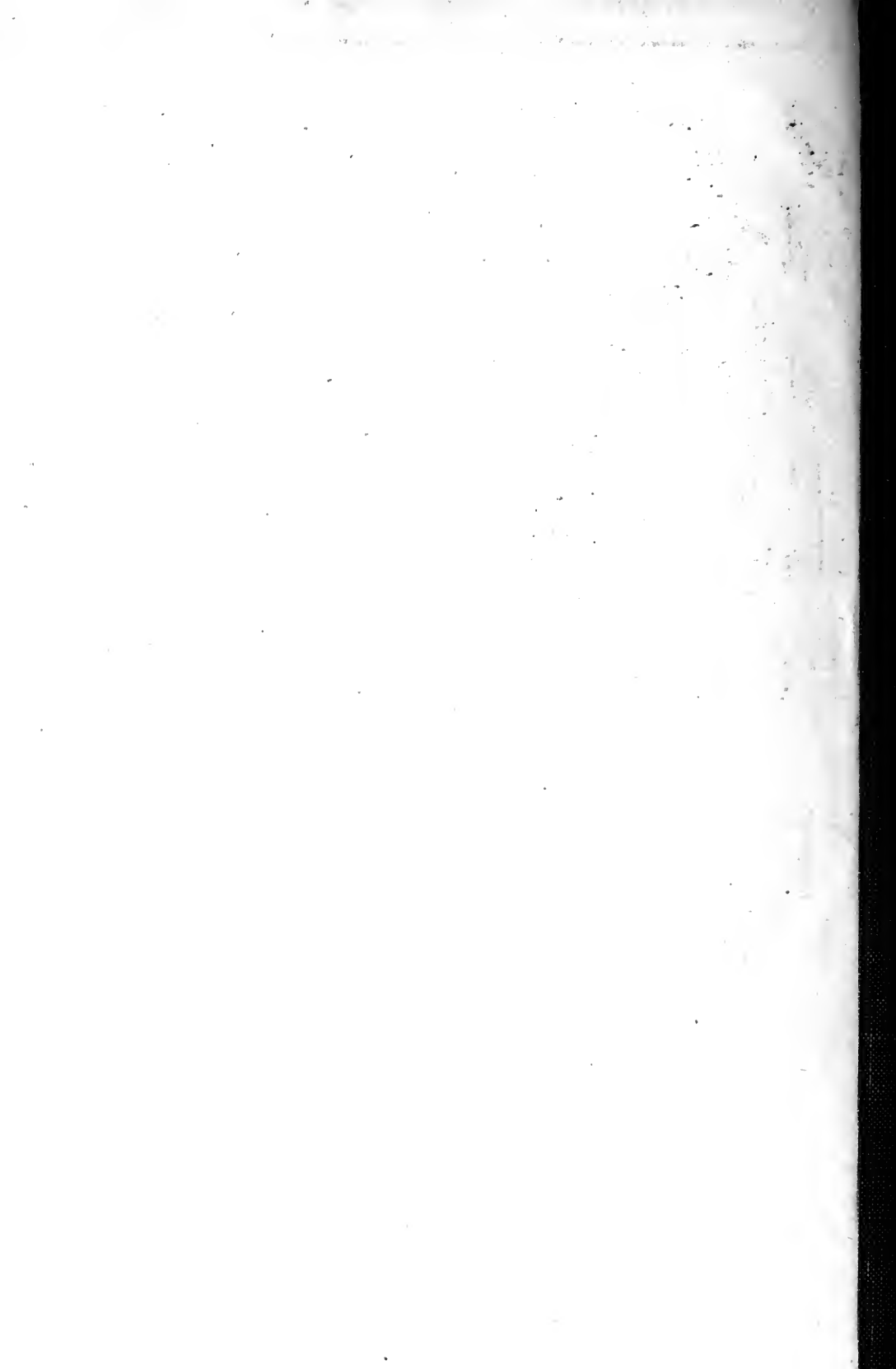
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